Ontario

2003 Annual Report

Lake Erie Management Unit

The Lake Erie Management Unit of the Ontario Ministry of Natural Resources is responsible for managing the fishery resources of the Ontario waters of Lake Erie, as well as the upper Niagara River, the Detroit River, Lake St. Clair, and the St. Clair River.

Ontario has been responsible for managing the fishery resources of these waters since 1898. In 1992, the Lake Erie Management Unit was created to improve Ontario's ability to manage these important resources. The Unit is based in London with field offices in Port Dover and Wheatley.

VISION: The Lake Erie Management Unit will contribute to the environmental, social, and economic well-being of the people of Ontario through the sustainable development of fishery resources within the Lake Erie basin.

MISSION: To ensure the long-term health of the Lake Erie ecosystem and to promote the sustainable harvest and development of its fishery resource through sound science, assessment, regulation, and advocacy.

GOAL: To foster and encourage the understanding of all users and partners on the complexity of managing the fishery resource of Lake Erie, to minimize conflict, and to endorse sound fishery management practices.

Lake Erie's fishery resources are managed cooperatively by Ontario and the four U.S. states – New York, Pennsylvania, Ohio and Michigan - bordering the lake through a process set out by the Great Lakes Fishery Commission and the Joint Strategic Plan for Management of Great Lakes Fisheries. Lake St. Clair's fishery resources are managed cooperatively by Ontario and Michigan under the same process.

Cover Photos: (top to bottom) –

- Removing the stomach from a walleye as part of eastern basin angler survey in Port Colborne;
- Dunnville area angling clubs donated new boat to conduct research on southern Grand River ;
- electrofishing to assess fish abundance and distribution on Grand River near York;
- annual angler creel survey on Long Point Bay, second longest operating creel survey in Ontario.

2003 Annual Report
Lake Erie Management Unit

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2003 Status of Major Stocks

The following is an overview of the status of major species in Ontario waters of Lake Erie for 2003. Lake-wide perspectives are available in the following reports of the Lake Erie Committee (LEC) of the Great Lakes Fishery Commission:

- Walleye Task Group Report
- Yellow Perch Task Group Report
- Forage Task Group Report
- Cold Water Task Group Report
- Habitat Task Group Report

A more detailed account of the results of the 2003 Lake Erie Management Unit (LEMU) core program fisheries assessment activities can be found in LEMU 2003 Status of Major Stocks[1].

Walleye

In 2003, commercial catch rates for walleye increased from those observed in 2002. These increases are a result of high survival rates and the strong 1999 and 2001 year classes supporting the fishery. In contrast the 2002-year class appeared to be one of the weakest as young-of-the-year. In 2003, the young-of-the-year (YOY) index in the west basin yielded the largest showing of young walleye for the recent time series. While the prospect for 2004 recruitment of 2-year-old walleye is not promising (because of the weak 2002 year class), the 2003 year class will undoubtedly contribute strongly to the fisheries of 2005 and 2006.

Walleye in eastern Lake Erie consists of mixed stocks including those originating from east basin shoals, the Grand River, and immigrants from the rest of the lake. Representation of walleye ages 4 and older was greater in eastern Lake Erie compared to other regions of the lake, based on the age composition of the commercial harvest and the partnership gill net index. The greater average age of walleye in the eastern basin is due in part to the contribution of older migratory individuals originating from the western basin.

Yellow Perch

Yellow perch populations in Lake Erie have undergone large-scale fluctuations in recruitment and survival over the last several decades. High harvest levels during the 1980s could not be sustained through the early 1990s due to low recruitment and low survival rates. Increased recruitment during the mid-1990s peaked with the exceptionally strong 1996-year class. This cohort was deemed exceptional in the western basin and strong in outer Long Point Bay based on catches of young-of-the-year fish in index trawls. The magnitude of this year class was later verified, as it accounted for more than half of the 2000 commercial harvest in all areas of Lake Erie. In 2001 the yellow perch hatch was considered above average, it contributed significantly to the commercial fishery in 2003 and will continue to contribute to the fishery in 2004. In 2002, yellow perch YOY abundance was observed to be one of the lowest on record. This will have implications for the fishery in 2004 as yellow perch populations decline below their recent peak in abundance. However, similar to the strong year class seen for walleye, the 2003 YOY trawl

[1] Lake Erie Management Unit. 2004. 2003 Status of Major Stocks. Technical Report. 61 pp.

index for yellow perch was one of the highest on record. Given the contributions of the next strongest hatch on record (1996) to the fish population, it is expected that this (2003) year class will continue to support a large and healthy yellow perch fishery in the years to come. This year class will begin to recruit to the various sport and commercial fisheries in 2005, and make a major contribution lake-wide by 2006.

Rainbow Smelt

The lake-wide smelt harvest of 7.2 million pounds represented 46% of the assigned quota in 2003. The lower than quota harvest may be attributed to the declining abundance of smelt and to some extent, market demand. Year class strength continues to oscillate from year to year, possibly driven by the cannibalistic behaviour of yearling smelt and poor survival beyond age 2, the age at which most smelt are mature. Recent recruitment of rainbow smelt has remained below levels of the 1980s and early 1990s, as indicated by Outer Long Point Bay index trawling and commercial fishery trends. In contrast, the 2003 YOY smelt abundance was the largest for the time series, with this year class set to support the bulk of the smelt fishery for the next 2 years. These fish will undoubtedly contribute greatly to the diets of walleye and yellow perch throughout the lake.

Lake Whitefish

Ontario's lake whitefish harvest of 580,000 pounds in 2003 was half of that of 2002. The majority of Ontario's harvest (60%) was primarily in late autumn in quota area 1 waters. The age composition of the harvest was broad, represented by ages 4 to 17 with a mean age of 7.4 in the west basin. The 1996 and 1997 year classes were the most abundant in the commercial fishery. A large decline in catch-per-unit-effort in 2002 and 2003 (up slightly in 2003 over 2002) with respect to 2001 was observed, with weather related effects on the fishery and poor recruitment through the late 1990s being possible causal factors.

While fishery trends help to describe the status of whitefish stocks, estimating recruitment of younger fish remains a challenge. Due to migratory and schooling behavior of this species, whitefish assessment in Lake Erie is complex and problematic. During the last two years, whitefish catches have been negligible in the east basin index, though central basin catches ranged from moderate to above average. The 2001 and 2003 year classes however, appear promising to the fishery in the future. While observed in moderate numbers in the 2000 partnership index program, up until 2001 there was little evidence of the 1997-year class of whitefish in Lake Erie. However, this year class contributed significantly to the 2003 fishery. In order to increase our knowledge of whitefish stocks using a fishery independent method, a whitefish spawning survey is planned for the autumn of 2004.

2003 Project Updates

Sport Fishing Regulations
Discussions with stakeholder groups were initiated during 2003 regarding proposed changes to sport fishing regulations to take effect on January 1, 2004. The proposed changes were for walleye, yellow perch, muskellunge and lake sturgeon.

Proposed changes included a closed walleye season in spring in the central and western basins of Lake Erie, an increase in the daily limit for yellow perch in the eastern basin of Lake Erie, a standardized length limit for muskellunge that would extend from the Niagara River to the St. Clair River, inclusive, and a closed season for lake sturgeon on the Detroit River.

Lake Erie Program Committee
The Lake Erie Program Committee was initiated in 1992 as a means for Lake Erie fishery resource user groups to interact with the Ontario Ministry of Natural Resources' Lake Erie Management Unit on issues related to the management of the resource. The Program Committee provides a forum for increased communication and transparency between the Lake Erie Management Unit and its client groups.

Membership in 2003 consisted of the following:

Ontario Commercial Fisheries Association
Rob Graham – Executive Director
Ron Harvey – Operations Manager
Kevin Reid – Fisheries Biologist
Larry Jackson - President

Ontario Federation of Anglers and Hunters
Russ Piper – Past President of the OFAH and Chairman of Provincial Fish Committee
Felix Barbetti – Zone J and Dunnville Hunters and Anglers Club
Alf Marinelli – Zone J and Port Colborne and District Conservation Club
Dave Brown – Fisheries Biologist

Bait Association of Ontario
Harold Harvey – Executive Director
Bob Conroy - Director

Meetings were held May 20, July 14 and November 28. Meeting topics included:
Final quota allocations, yellow perch alternate allocation model, East Basin yellow perch, yellow perch sport fish regulations, decision analysis, whitefish, US/Ontario 2004 walleye harvest levels, southern Grand River, East Basin net-free zone, cormorants, status of stocks, changes to muskie size limit, Detroit River sturgeon season, Lake Erie walleye daily limit, Lake St. Clair fish community goals and objectives, botulism.

Enforcement Update

The enforcement program did not operate at full staff this year due to one officer leaving the unit and another officer moved out of the field to work on a special project. The Lake Unit Intelligence / Investigator position was recently filled from within the unit and a conservation officer position was to be filled to bring the unit back to full capacity. The ongoing on-water partnership with the Ontario Provincial Police continues to provide good value to programs.

Officers contacted a total of 9,332 residents and non-residents; issued 358 warnings and laid 463 charges. The compliance rate for the unit was 91.2%, which is well within the Provincial standards. Commercial fish charges accounted for 35.2% of the charges and sport fish 57.8%. The remaining 7% of the charges occurred while assisting other districts with big and small game enforcement checks. Along with routine work some officers and the enforcement supervisor were involved in a major investigation concerning the illegal commercialization of fish that will be going to court very shortly. A total of $19,535.00 was collected in fines for commercial fish convictions and $45,118.00 for sport fish convictions.

The Port Officer program continued to operate effectively with officers doing commercial fish weight verification and vessel inspections at dockside and in the plants. Overall, the weight variation between fisher declared weight and the port officer weight was less than 3%. This was a drastic improvement from previous years when there was no weight verification program at dockside and the variation was anywhere from 5% to 18%. Port Officers have established a good working relationship with the weight verification clerks employed by the Ontario Commercial Fisheries' Association that observe weights in the plants.

Contaminant Monitoring

The LEMU participates in both the federal and provincial fish contaminant monitoring programs on Lake Erie. Samples of walleye (western basin), rainbow smelt (central basin) and lake trout (eastern basin) have been collected annually for analysis by the Department of Fisheries and Oceans, Canada (DFO) as part of its Great Lakes Contaminants Surveillance Program (Table 1). Whole body burdens of polychlorinated biphenyl's, organochlorine pesticides and trace metals, such as mercury, have been measured. Lake Erie consistently has the lowest level of contamination of all of the Great Lakes monitored by DFO. Results of these analyses were provided by Dr. Mike Whittle, Department of Fisheries and Oceans, Burlington, Ontario.

Fillets from various fish species in Lake Erie are collected regularly and analysed by the Ontario Ministry of Environment and Energy as part of their Sport Fish Monitoring Program (Table 2). The results of these analyses, along with trends and guidelines for consumption, are reported biannually in the publication *Guide to Eating Ontario Sport Fish*.

Table 1. Number of fish collected by the Lake Erie Management Unit for analysis by Department of Fisheries and Oceans, Canada (DFO) as part of their Lake Erie contaminant monitoring programs, 2003. In general, DFO requests 50 or more fish per species. A blank cell signifies that the species was not required for that region on the lake.

	Western Basin	**Central Basin**	**Eastern Basin**
Walleye	50		
Rainbow smelt		40	
Lake trout			50
Lake whitefish			
Alewife			
Emerald shiner	100		

Table 2. Number of fish collected by the Lake Erie Management Unit for analysis by the Ontario Ministry of Environment and Energy (MOEE) as part of their Lake Erie contaminant monitoring programs, 2003. In general, MOEE requests 20 fish per species. A blank cell signifies that the species was not required for that region on the lake.

	Lake St. Clair	Detroit River - Upper	Detroit River - Lower	Western Basin	Central Basin	Rondeau Bay	Long Point Bay	Eastern Basin
Bowfin							19	
Coho salmon								
Chinook salmon								
Rainbow trout					20			8
Lake trout								10
Rainbow smelt								100
Lake whitefish								
Northern pike								
Suckers								
Common carp	20			2		0		
Channel catfish	20	13	0					
White perch	20							
White bass		20	20	20	20	0	20	20
Rock bass								
Pumpkinseed								
Bluegill sunfish								
Smallmouth bass				7			20	
Largemouth bass								
Black crappie	2					0		
Yellow perch	10			20	20		20	
Walleye	20	20	20	20	20		20	20
Brown bullhead								
Freshwater drum	20	20	0	0	20		20	

Stocking Summary
In 2003, a total of 52,672 yearling trout were stocked into the Ontario waters of Lake Erie. The MNR Normandale Fish Culture Station (NFCS) stocked 11,672 yearling rainbow trout (average weight 20.77g) at two locations in Big Creek on April 23, 2003. A left pectoral clip was applied to all fish.

The NFCS also transferred 65,000 rainbow trout fingerlings and 100,000 brown trout eggs to the Lake Erie Salmon and Trout Club in Port Stanley in fall 2002. These fish were raised in the club's hatchery facility in Port Stanley and were stocked in 2003 as follows:

- 27,000 yearling rainbow trout and 7,000 brown trout into Mill Creek (a tributary of Kettle Creek) in May 2003; and
- 10,000 yearling rainbow trout into Erieau Harbour in September 2003.

More detailed information on salmonid stocking into Lake Erie in 2003 by all jurisdictions is provided in the 2003 annual report of the Lake Erie Coldwater Task Group[2].

2003 Outreach Updates

Angler Outreach
The Lake Erie Management Unit has conducted annual public meetings with anglers since 1997. The meetings are intended to attract anglers and other members of the public with an interest in Lake Erie's fishery, and are designed to provide an opportunity for fisheries managers and anglers to get together and share information.

In 2003, five open house-style public meetings were held in Port Colborne (April 29), Brantford (April 30), London (May 1), Windsor (May 6), and Wallaceburg (May 7). In addition, LEMU staff made presentations in Simcoe on April 26 as part of the Long Point Bay Anglers Association annual meeting.

Location	Attendance
Simcoe	60
Port Colborne	45
Brantford	24
London	26
Windsor	40
Wallaceburg	50
Total	**245**

[2] Coldwater Task Group. Report of the Lake Erie Coldwater Task Group to the Standing Technical Committee of the Lake Erie Committee: 24 March 2003. Pp. 56.

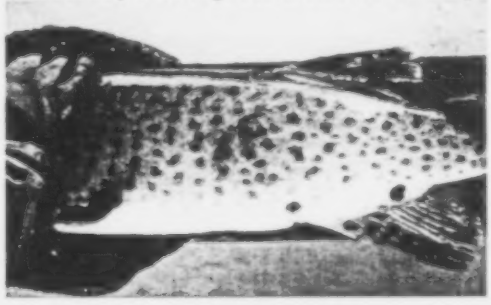
The 2003 meetings followed the format that was used in previous years. Following opening remarks, each participant was given an opportunity to identify themselves, their affiliation, why they had come, and a specific topic or issue that they wished to discuss. This was followed by formal presentations by LEMU staff on current research, assessment, and management activities.

The following topics were presented by LEMU staff:

- Update on the five year Eastern Basin Rehabilitation Plan
- Status of the Lake Erie fish stocks
- 2002 Angler Diary Program
- Botulism Update
- Muskie Disease
- 2002 Lake St. Clair and Detroit River Angler Creel Survey
- Canada-Ontario Agreement
- Enforcement updates

Muskie Disease

Staff from the Michigan Department of Natural Resources noticed external red sores on some muskellunge during routine sampling on Lake St. Clair in 2000. The sores were raised, reddish and scabby looking, often circular in shape, and varied in size from 3-20mm.



Samples were collected from the sores and from internal organs. Results of analysis of the tissue samples indicated the presence of several different types of bacteria and fungi typical of secondary infections. In addition, *Piscirickettsia* bacteria were also found and were identified as the cause of the sores.

Piscirickettsia belong to a group of emerging pathogens in fish. The first species of *Piscirickettsia* that was recognized in fish was *Piscirickettsia salmonis*, a pathogen of salmonids that has been associated with high mortality in culture situations in Europe, North America and South America. This species was not identified in Lake St. Clair samples, nor were there previous reports of *Piscirickettsia* in wild fish, Great Lakes fish, or muskellunge.

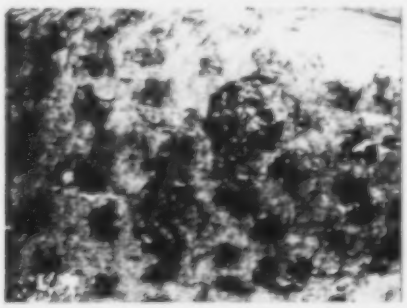
The sores are very similar in appearance to sores caused by silver lamprey. The comparison of the sores is as follows:

Silver Lamprey

- typically flat
- whitish colour
- area where scales were removed is visible

Muskie Disease

- raised bumps
- pink-red colour
- no sign of scale marks



Angler diary data were checked and there were no reports of the sores on fish caught in Ontario waters and reported through the angler diary program or in the 2002 Lake St. Clair creel survey (~800 fish reported by anglers in these two programs).
Michigan staff were working to answer a number of questions including:

- What is the source of the disease?
- How is the disease spread?
- How widespread is the disease?
- Do other species have the disease?
- Has the disease caused mortality?

Michigan staff and staff from LEMU took every opportunity in 2003 to educate local anglers about the disease and increase awareness about the disease. Special muskie lesion diaries were circulated to muskie anglers from Ontario and Michigan to try to track the incidence of the sores on muskie caught in Lake St. Clair.

Muskie Lesion Diary Results for 2003

A total of nine muskie anglers returned lesion diaries that contained records of the presence or absence of lamprey wounds, red sores, or other abnormal wounds on the muskie they boated in 2003. A total of 501 muskie observations were recorded. The fish ranged in length from 20 inches to 54 inches. Red sores or *Piscirickettsia* lesions were observed on 20 fish (4%), while lamprey marks were observed on 38 fish (7.6%). Both red sores and lamprey marks were absent from fish less than 32 inches in length (Figures 1 and 2). Only two fish were recorded with both red sores and lamprey marks (0.3%).

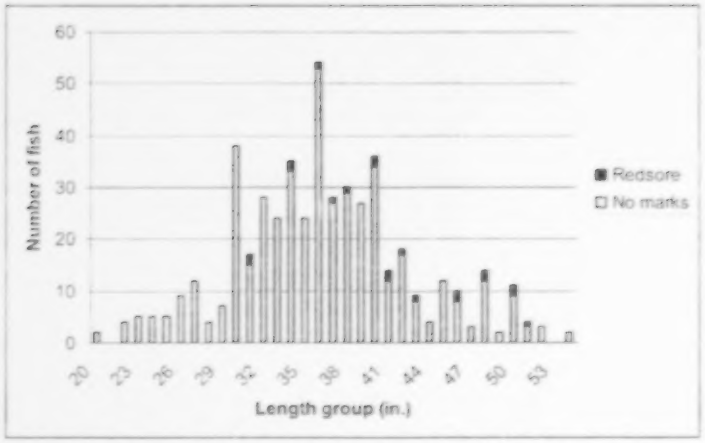


Figure 1. Length frequency distribution of muskies with and without red sores characteristic of *Piscirickettsia*.

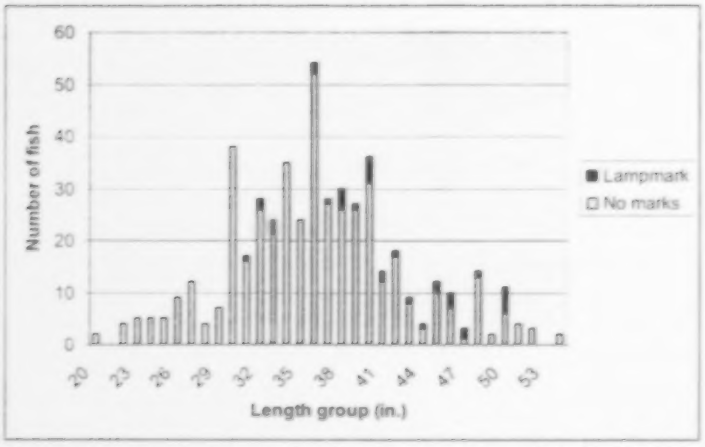


Figure 2. Length frequency distribution of muskies with and without lamprey wounds or marks.

The number of muskie observations recorded by anglers varied by month, with nearly 65% of all observations recorded in July and August (Figure 3). Numbers of fish observations recorded in September, October, and November were much lower. Red sore observations were recorded from June to October, with the highest numbers of fish exhibiting sores in July and August. However, the highest proportion of fish observed with red sores were noted in October and June (Figure 4).

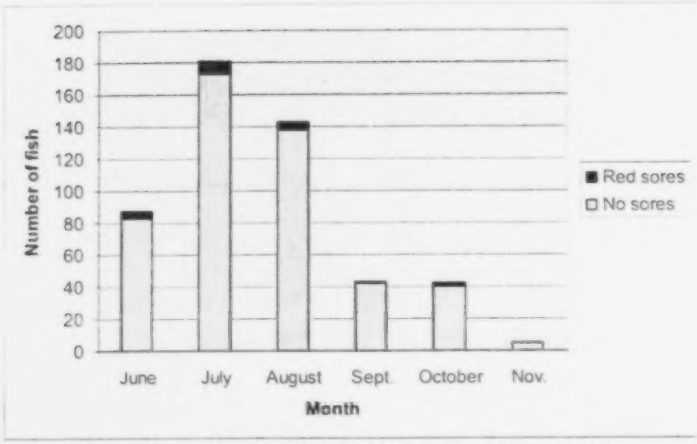


Figure 3. Numbers of muskies observed with and without red sores by month.

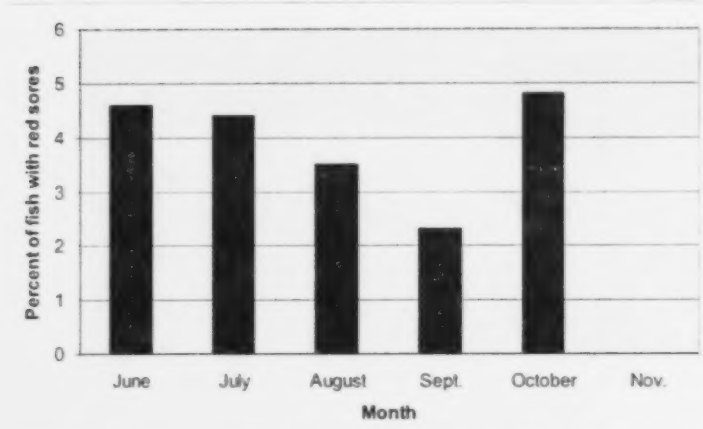


Figure 4. Percent of muskies observed with red sores by month.

Commercial Outreach

The LEMU conducted three meetings with members of the commercial fishing industry in 2003. The meetings provided an opportunity for individual members of the industry to ask questions, raise concerns, and make comments directly to LEMU staff. Each meeting was initiated by introductory remarks by the Lake Erie Manager, and then the floor was opened to questions and discussion.

The meeting with east basin fishers was held on February 24th at the LEMU Port Dover Fisheries Station; the central basin meeting was held in the afternoon of February 25th at the Port Stanley Fire Hall; and the west basin meeting was held on the evening of February 25th at the Wheatley Legion Hall.

The most common issues raised during the meetings included:

- Yellow perch quotas;
- Achieving a balance between walleye and yellow perch harvest;
- Initial (spring) yellow perch and walleye quota allocations;
- East basin yellow perch cap;
- Utilizing commercial fisher traditional ecological knowledge; and
- Transparency in decision making.

Other Outreach

Niagara Public Health Unit
February 27, 2003

St. Thomas Field Naturalists
March 7, 2003

Outdoor Writers of Canada – Toronto Fishing Show
March 1, 2003

Erie Quest, Leamington
July 19, 2003

2003 Project Reports

Two project reports written in 2003 are included in the Appendix at the end of the Annual Report.

Stakeholder Objectives

Report by: E. Wright

This report outlines stakeholder objectives used for the Lake Erie Committee's Decision Analysis Initiative. Input was received directly from the Ontario Commercial Fisheries' Association. Angler attitude surveys were used to gain insight into the objectives of anglers fishing on Lake Erie and Lake St. Clair.

Sportfisheries in Eastern Lake Erie in 2003

Report by: E. Arnold, P. Ryan, D. Greenwood, T. MacDougall, B. Locke

This report describes the results of an access point creel survey of the eastern basin, the Grand River and the Niagara River. The survey was funded by *Ontario's Living Legacy* Fish and Wildlife Protection and Enhancement program.

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Appendix

Stakeholder Objectives
Report by: E. Wright

Sportfisheries in Eastern Lake Erie in 2003
Report by: E. Arnold, P. Ryan, D. Greenwood, T. MacDougall, B. Locke

Lake Erie Management Unit
Stakeholder Objectives
October, 2003
Prepared by: E. Wright

Decision Analysis

The Lake Erie Committee (LEC) began the process of incorporating Decision Analysis (a process that allows quantitative assessment of various management alternatives when making decisions) into their decision making process in the fall of 2002. The Decision Analysis process would help evaluate the risk and uncertainty associated with the annual allocation of harvest for Lake Erie fisheries, in particular, walleye.

One of the greatest advantages of the Decision Analysis process is the improved transparency of the decision making process for stakeholders because it forces managers to clearly identify, to themselves and others, the management objectives being applied.

The first step in the Decision Analysis framework is the development of Management Objectives. The objectives that will be integrated into the Decision Analysis framework will come from the LEC and be specific to the walleye fishery. In order for these objectives to be developed, each LEC agency must clearly articulate their own Management Objectives. The Lake Erie Management Unit (LEMU) will be developing objectives and invited stakeholder groups from the Lake Erie Program Committee to contribute Walleye Fishery Objectives that the LEMU could incorporate and consider within the broader Decision Analysis context.

In March, 2003, the Lake Erie Manager invited representatives from each stakeholder group to work with LEMU staff to develop a set of walleye fishery objectives for each of their groups. Representation by each group was to be self-determined.

The Decision Analysis process was briefly presented at the Commercial Outreach meetings in February, 2003, and at Angler Outreach meetings in April and May, 2003. Background reading material was provided and an offer was made for LEMU staff to attend any future meeting with stakeholders to discuss the Decision Analysis process.

Stakeholder Walleye Fishery Objectives were requested by early June, 2003.

Lake Erie Stakeholders

Bait Association of Ontario

The Bait Association of Ontario (BAO) would be represented by their Liaison Director, who would discuss objectives with BAO members and provide management objectives to LEMU in the fall of 2003.

At the time of this draft document, the Liaison Director has not yet provided LEMU with objectives.

Ontario Commercial Fisheries Association

The Ontario Commercial Fisheries Association (OCFA) provided the objective on behalf of the commercial industry. The OCFA does not separate the requirements for walleye and yellow perch populations, therefore, provided one objective:

- *An average annual harvest of 15 million lbs of walleye + yellow perch, with an acceptable range of harvest from 10 million to 20 million lbs*

Ontario Federation of Anglers and Hunters

The Ontario Federation of Anglers and Hunters (OFAH) decided that they would be represented by their Lake Erie Program Committee representatives and their Biologist. It was determined that the Biologist, working with LEMU staff, would develop an angler survey that would be distributed by the OFAH to anglers affiliated with angling clubs in the Lake Erie area. From the returned surveys, the Biologist would develop objectives that would be provided to the LEMU in the fall of 2003. At the time of this draft document (October 2003), the survey had not been drafted.

Lake Erie Anglers

In addition to the surveys of club affiliated anglers, the LEMU would add questions, specific to the walleye fishery, to angler attitude surveys being conducted during the Lake Erie East Basin Creel Survey (June - August, 2003). The attitude surveys were:

1) conducted at access points in the East Basin,
2) conducted on every fifth encounter during on-water roving creel surveys,
3) mailed out to those persons who filled in a survey card left on vehicles at access points in the East Basin.

The LEMU also conducted an attitude survey at the Port Colborne and District Conservation Club's 444 Walleye Tournament held in August, 2003.

The purpose of using angler attitude surveys at all four opportunities was to survey a broad group of anglers that might have differing opinions. It was intended to have these surveys sample avid anglers, occasional anglers and tournament anglers to gain insight into the opinions of walleye anglers.

To date, there have been 123 angler attitude surveys completed. The surveys that were distributed had the similar questions, however, the surveys were tailored to the prospective people surveyed. Not all participants chose to answer each survey question. Thanks are extended to Erin Arnold, Heather Whitford, Sonya Greenslade, Jake Ruegg, Jotham Dumesnil, April Beard, Elissa Smith, and Alf Marinelli for their assistance distributing the attitude surveys.

Of those people surveyed, 81% identified themselves as anglers, the remaining 14% of respondents were self-identified as boaters. The respondents originated from southwestern (52%) Ontario, central (39%) Ontario, the United States (8%), and Alberta (1%).

The majority of anglers practiced catch-and-release (71%) but only 20% of anglers with Ontario fishing licences had purchased a conservation licence. Walleye was ranked third (with 65% of angler interest) on the list of fish most preferred by anglers in the east basin. Both occasional and avid anglers filled in surveys and half of anglers fished for walleye at least once a week:

- 24% of anglers fished for walleye 1 time per week,
- 4% fished 1.5 times per week,
- 13% fished 2 times per week,
- 4% fished 2.5 times per week,
- 5% fished 3 times per week,
- 1% fished 4 times per week.

Some anglers were asked how many times per year they fished for walleye. Of those that responded:

- 40% responded less than 5 trips per year,
- 17% took 5-10 trips per year,
- 23% took 10-25 trips per year,
- 19% took 25-50 trips per year.

Anglers were asked if they were satisfied with the fishing on Lake Erie, those that were satisfied (71%) identified the fishing experience as being a key component of their satisfaction (i.e., nice day out 52%, get away from it all 37%, company of friends 44%). Many others identified the fishing activity as being important (i.e., caught a few fish 57%, caught target fish species 43%). Several anglers indicated that catching a lot of fish, 22%, or catching big fish, 29%, were important components to their satisfaction.

Anglers that were not satisfied with Lake Erie fishing indicated that not catching any fish was a key factor (66%) as was poor weather or water conditions (20%).

In general, those surveyed had mixed reaction to the health of the walleye population in Lake Erie (57% of respondents indicated they thought the walleye population was not healthy). When asked what would make the population better, the majority of respondents suggested the reduction or elimination of commercial fishing (64%). Other suggestions included stocking (15%), slot limits (11%), more walleye (6%), clean water (4%), removal of invasive species (4%), and improved river spawning (2%).

For the majority of respondents, more walleye (81%) were more important than larger walleye (19%).

Most anglers expected to catch 4 walleye in a typical 4 hour fishing trip (27%), although responses ranged from 0 walleye in 4 hours to 10 walleye.

Many anglers prefer to catch walleye that are between 2 and 10 lbs (average=7 lbs), but selected walleye between 1 and 8 lbs (average=4 lbs) to eat. Trophy sized walleye were described as between 8 and 15 lbs. Approximately one third of anglers that responded to this question were not interested in fishing for trophy walleye.

The surveys were conducted in the East Basin where the current daily limit is 4 walleye. Of those surveyed, 72% of anglers would continue to fish for walleye if this daily limit was lowered.

In general, anglers indicated satisfaction if they had a nice day out with friends and/or they caught a few fish. In order for an angler to catch a target species, they must have some angling skills and there must be a sufficient number of fish available to be caught. Anglers were generally not satisfied if they did not catch fish, supporting the importance of a sufficient number, or lower limit, of fish available to be caught. In addition, 28% of anglers indicated they would not continue to fish for walleye if the east basin creel limit was below 4 walleye per day. Many anglers wanted more walleye and most expected to catch no fewer than 2 walleye in a typical 4 hour fishing trip.

Two sport fishery objectives can be inferred from the responses provided by anglers:

- *have enough walleye to be satisfied on a typical fishing trip*
  - target: minimum of 2 walleye in a typical 4 hour trip (catch-per-unit-effort = 0.5/hr)
  - target: preferred at 3 walleye in a typical 4 hour trip (catch-per-unit-effort = 0.75/hr)
  - target: optimum of 6 walleye in a typical 4 hour trip (catch-per-unit-effort = 1.5/hr)

- *have more than one year class of walleye structuring the population*
  - target: need abundant consumption sized (3 lb) and catch-and-release sized (8 lb) walleye
  - target: need numerous trophy sized (12 lb) walleye.

Access point surveys summary

In general, anglers indicated satisfaction if they caught a few fish of the species they were targeting and walleye was ranked first in a list of sought after by anglers surveyed at access points in the east basin. The majority of anglers wanted more walleye, expecting to catch no fewer than 2 walleye in a typical 4 hour fishing trip. However, 41% of anglers indicated they would not continue to fish for walleye if the east basin creel limit was below 4 walleye per day.

Therefore, an inferred walleye sport fishery objective is:

- *have enough walleye to be satisfied on a typical fishing trip*
  - target: preferred at 2 walleye in a typical 4 hour trip (catch-per-unit-effort = 0.5 / hr)
  - target: optimum of 6 walleye in a typical 4 hour trip (catch-per-unit-effort = 1.5 / hr)

In general, anglers indicated they were interested in catching walleye between 2 and 15 lbs and 44% of the anglers surveyed were not interested in trophy walleye. On average, walleye between 4 and 6 lbs were satisfactory to anglers, however different preferences for walleye caught generally, caught as food fish, or caught as trophies were identified. Therefore, an inferred walleye sport fishery objective is:

- *have more than one year class of walleye structuring the population*
  - target: need abundant consumption sized (3 lb) and catch-and-release sized (6 lb) walleye
  - target: need some trophy sized (10 lb) walleye.

Roving creel surveys summary

In general, anglers questioned in the roving creel surveys were not walleye fishers (ranked 5th). The anglers surveyed were interested in catching a few fish and were dissatisfied if they didn't catch fish, however, catching the species they were targeting was not a key component for their satisfaction.
No inferred objectives for walleye came from these surveys.

Mail out surveys summary

In general, anglers indicated satisfaction if they caught the species being targeted and if a few fish were caught, however 44% of anglers were not satisfied. Walleye was ranked third in a list of sought after by anglers. The majority of anglers wanted more walleye, most anglers expecting to catch no walleye during a typical 4 hour fishing trip and 37% of anglers indicated they would not continue to fish for walleye if the east basin creel limit was below 4 walleye per day.

Therefore, an inferred walleye sport fishery objective is:

- *have enough walleye to be satisfied on a typical fishing trip*
    - target: preferred at 3 walleye in a typical 4 hour trip (catch-per-unit-effort = 0.75/hr)
    - target: optimum of 4 walleye in a typical 4 hour trip (catch-per-unit-effort = 1.0/hr)

In general, anglers indicated they were interested in catching walleye between 2 and 12 lbs and 50% of the anglers surveyed were not interested in trophy walleye. On average, walleye between 3and 5 lbs were satisfactory to anglers, however different preferences for walleye caught generally, caught as food fish, or caught as trophies were identified. Therefore, an inferred walleye sport fishery objective is:

- *have more than one year class of walleye structuring the population*
    - target: need abundant consumption sized (3 lb) and catch-and-release sized (7 lb) walleye
    - target: need some trophy sized (12 lb) walleye.

444 walleye tournament surveys summary

In general, anglers indicated satisfaction if they caught a few fish, caught big fish, and/or caught the species they were targeting. Walleye was ranked first in a list of sought after by anglers surveyed at the 444 walleye tournament. The majority of anglers wanted more walleye, expecting to catch 4 walleye in a typical 4 hour fishing trip. A larger proportion of anglers fishing in the tournament, compared with other anglers surveyed, indicated a preference for larger walleye. Most tournament anglers surveyed indicated they would not continue to fish for walleye if the east basin creel limit was below 4 walleye per day.

Therefore, an inferred walleye sport fishery objective is:

- *have abundant walleye to be satisfied on a typical fishing trip*
    - target: minimum of 2 walleye in a typical 4 hour trip (catch-per-unit-effort = 0.5/hr)
    - target: preferred at 4 walleye in a typical 4 hour trip (catch-per-unit-effort = 1.0/hr)

- target: optimum of 6 walleye in a typical 4 hour trip (catch-per-unit-effort = 1.5/hr)

In general, anglers indicated they were interested in catching walleye between 1 and 15 lbs and 25% of the anglers surveyed were not interested in trophy walleye. On average, walleye between 4 and 8 lbs were satisfactory to anglers, however different preferences for walleye caught generally, caught as food fish, or caught as trophies were identified. Therefore, an inferred walleye sport fishery objective is:

- *have more than one year class of walleye structuring the population*
  - target: need abundant consumption sized (4 lb) and catch-and-release sized (8 lb) walleye
  - target: need numerous trophy sized (12 lb) walleye.

Lake Erie Management Unit
Sportfisheries in Eastern Lake Erie in 2003

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In Partnership with Ontario Federation of Anglers and Hunters

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Introduction

In 1998, the Ministry of Natural Resources, in partnership with the Ontario Federation of Anglers and Hunters, completed the most recent lake-wide aerial creel survey that combined estimates of angling effort (determined from aerial counts of boats) with estimates of fishing success (determined from complete trip angler interviews). This information was used to determine total catch and harvest of a variety of recreationally and commercially important fish species found in Lake Erie.

The most important results from the 1998 survey revealed that angling effort was distributed unevenly across the lake (Western Basin 13%, Central Basin 16%, Long Point Areas 45% and Port Colborne Area 26%; Sztramko 2000). Overall, angling effort had increased by 33% from 1992, mainly due to the regulation change in 1996 that increased the number of rods used per angler from one to two in the offshore fisheries for walleye and salmonids (Sztramko 2000). The catch per unit effort (CUE) for walleye decreased by 58% in 1998 compared to 1992, due to lower angler success rates in the central basin, although CUE increased in the western and eastern basins (Sztramko 2000). In order to track changes in angler effort and harvests, it is important to complete this type of exercise periodically, and for L. Erie, this occurred in 2003, as described below.

The Ministry of Natural Resources received funding in 2003 from *Ontario's Living Legacy* Fish and Wildlife Protection and Enhancement program to conduct a creel survey on the eastern basin of Lake Erie. In order to reduce the funds required to carry out such a project, we modified our approach from 1998 (Sztramko 1999) by eliminating the aerial portion of the survey and using a basic access point creel survey to assess the state of the fishery throughout the eastern basin, including the Grand and Niagara Rivers.

In order to describe the principal recreational fisheries in this area, this report focuses on the status of yellow perch (*Perca flavescens*), smallmouth bass (*Micropterus dolomieui*), and salmonids such as rainbow trout (*Salmo gairdneri*) and coho salmon (*Oncorhynchus kisutch*), which are of great importance in the Long Point, Nanticoke area, as well as walleye (*Sander vitreus*) which is of special importance in the Port Colborne and Grand River areas.

This report documents the survey methods and the survey results including current estimates of angling effort, catch, and harvest.

Methods

The access point creel survey was conducted between June 2 and August 31, 2003 and encompassed nineteen sites along the eastern basin coastline of Lake Erie (Figure 1a), extending into the lower Grand (Figure 1c) and upper Niagara (Figure 1d) Rivers. The survey was based on a stratified random design, where the fishery was characterized by strata (month, day type, time of day, and access point). Individual access point estimates (harvest, catch, and catch per unit effort) were calculated from interview and activity data.

The strata for the design were defined as follows: (a) season; June, July, and August; (b) day type; weekday and weekend; (c) time of day; 0800-1400 (AM), 1400-2000 (PM); and (d) access point; Long Point Provincial Park, Old Cut Boat Livery, Sandboy Marina, Port Rowan Harbour, Fin and Feather, Booth's Harbour, Turkey Point Marina, Port Dover Marina, Port Dover (Black) Creek, Hoover's Marina, Port Maitland (west side of Grand River), Dunnville; Grand Island BBQ, Mohawk Marina, Sugarloaf Marina, Point Abino, Crystal Beach, Fort Erie Marina, Niagara Parkway Marina, and Chippawa Boat Ramp.

All data were entered and analyzed using Ministry of Natural Resources software, FISHNET Version 2 (Lester et al. 1989). Daily estimates of catch, harvest, and effort were calculated using the two-stage estimation formulae outlined in Appendix 1 (Lester and Korver 1996). The first stage of the estimation process was to obtain daily estimates, then the mean daily estimates for each stratum was multiplied by stratum size (i.e., number of days) to estimate totals for each stratum.

Fishery performance estimates were made for each access point. The access point results were then grouped together by area (see Table 1 for area definitions) to make comparisons to earlier census data. These data were also grouped together to produce estimates for the east and west walleye and yellow perch cap areas (see Figure 1b for cap area boundaries); boundaries used to manage fisheries during the OMNR's 5-year Eastern Basin Rehabilitation Plan.

At each access point, the returning boat traffic was recorded directly by interviewers at the launch or monitored by camera and recorded later. Boats were classified as fishing or recreational. These counts included boats returning to the public launch and boats returning to private slips. Only anglers utilizing the public launch were contacted for interviews.

In addition to the basic design, twelve additional (non-interviewed) launch sites were visited weekly to collect boat trailer count information. When compared to the boat trailer counts collected from the (on-average busier) interviewed sites we were able to predict the distribution of effort across the eastern basin.

Note:

The surveys conducted in the past produced estimates based on areas rather than by access point because fishing boats were counted while they were on the water by aircraft observers overhead. It was relatively simple to combine access point estimates into areas, although a problem arose when dealing with area 9 (Table 1). This area has no closely associated land based access points,

so although estimates were produced for this area in the past, the 2003 survey could not produce estimates for an area without access points. The solution to this problem was to group the data from areas 8, 9, and 10 for all years so that similar spatial units were being compared.

Results

Angling Effort Distribution

Most of the total estimated effort (189,613.5 rod-hours ± SE=4,189.0 rod-hours) was focused at three access points. Thirty-two percent of the total effort was recorded at Turkey Point Marina, while 15.5 % was recorded at Hoover's Marina in Nanticoke, and 15.5 % at Sugarloaf Marina in Port Colborne. The marina in Port Dover was a close fourth, with 9.9 %. The remaining 15 access points (all under 4 % each), combined to make up the remaining 26.6 % of the total angling effort (Figure 2).

Total angling effort was distributed by month as follows: June- 32.3 %, July- 26.2 %, and August- 41.4 %. Slightly more angling effort occurred on weekends (52.6 %) compared to weekdays (47.4 %). Eighty-two percent of the total angling effort occurred from 1400-2000, while only 17.8 % occurred from 0800-1400.

Each angler fished with an average of 1.1 rods, and each angling party fished with an average of 2.3 rods.

Catch, Harvest, Catch Per Unit Effort Estimates

All Species

Anglers caught an estimated 282,473 fish and harvested 139,082 of them (49.2 %, Table 2) between June and August. Yellow perch had the highest estimated catch of 118,408 fish (harvest of 86,782), making up 41.9 % of the total fish caught and 62.4 % of the total fish harvested. Smallmouth bass were the second most common fish caught, resulting in an estimated catch of 94,170 fish for the summer (33.3 % of the total catch and 17.9 % of the total harvest). Anglers caught an estimated 19,080 white bass (6.8 % of total catch and 9.6 % of total harvest), 13,518 largemouth bass (4.8 % of total catch and 0.6 % of total harvest), 12,406 round goby (4.4 % of total catch and 5.5 % of total harvest), 7,875 freshwater drum (2.8 % of total catch and 0.5 % of total harvest), 5,056 bluegill (1.8 % of total catch and 0.2 % of total harvest), 4,966 rock bass (1.8 % of total catch and 0.3 % of total harvest), and 3,231 walleye (1.1 % of total catch and 1.9 % of total harvest).

Yellow Perch

An estimated 118, 408 yellow perch were caught between June and August by anglers in the eastern basin in 2003. Anglers caught 44.0 % of these fish in June, 12.2 % in July, and 43.8 % in August. Yellow perch were primarily caught by anglers fishing from Port Dover Marina (38.5 %), Hoover's Marina (26.0 %), Turkey Point Marina (20.5 %), and Long Point Provincial Park (8.2 %; see Table 3).

From June through August, the yellow perch catch per unit effort (CUE; based on observed numbers) for all anglers (those who targeted yellow perch combined with those who did not) was estimated to be 0.5 fish/rod-hour. For those who targeted yellow perch, the CUE was much higher at 1.8 fish/rod-hour. The CUE was the highest in June, followed by August, then July.

The yellow perch CUE for all anglers fishing out of Port Dover Marina was estimated at 2.8 fish/rod-hour (CUE for target anglers was 3.0 fish/rod-hour). The CUE for all anglers at Hoover's Marina was 1.2 fish/rod-hour, and the CUE for target anglers was 2.2 fish/rod-hour. Turkey Point Marina CUEs were slightly lower at 0.3 fish/rod-hour for all anglers and 1.2 fish/rod-hour for target anglers.

Walleye

Eastern basin anglers caught an estimated 3,232 walleye in 2003 with 17.5 % caught in June, 49.9 % in July, and 32.6 % caught in August. The harvest estimates follow a similar pattern with 13.7 % harvested in June, 50.4 % in July, and 35.8 % in August.

Estimates for individual access points are presented in Table 4. Walleye catch and harvest estimates were highest from anglers who fished out of Sugarloaf Marina. This site provided observations of 37.5 % of the total catch and 37.8 % of the total harvest. Most of the remaining catch and harvest was taken by anglers who launched out of either the Dunnville BBQ (20.1 % of total catch and 15.7 % of total harvest) or Port Maitland (west side of Grand River; 18.6 % of total catch and 19.4 % of total harvest). Of the 7 remaining sites where walleye were caught, only anglers out of Turkey Point Marina, Port Dover Marina, and Point Abino contributed greater than 4% (each) to the total catch estimates.

Overall fishing success was estimated at 0.03 walleye/rod-hour for all anglers, and 0.1 walleye/rod-hour for anglers who targeted walleye. By month, CUE was highest in July, followed by August then June. The sites where the highest walleye CUEs for all anglers were observed were, the Grand River (Dunnville BBQ), Port Maitland and Point Abino (each with 0.1 fish/rod-hour). The CUE for all anglers using the Sugarloaf Marina access point was 0.05 fish/rod-hour. Targeted effort resulted in slightly higher CUEs from Turkey Pt. Marina, Point Abino, Dunnville and Port Maitland (each with 0.2 fish/rod-hour). Anglers targeting walleye from Port Dover, Crystal Beach, Sugarloaf Marina and Long Point Provincial Park had an overall CUE of 0.1 fish/rod-hour.

Smallmouth Bass

The 2003 eastern basin fishery resulted in an estimated catch of 94,171 and an estimated harvest of 24,887 smallmouth bass. Catches were highest in June (59.0 % of the total) then declined in July (25.4 %), and in August (15.2 %). Harvest estimates followed a similar trend, (55.6 % in June, 34.1 % in July, and 10.3 % in August). Catch and harvest estimates are higher in June due to high fishing pressure exerted during bass season's opening weekend (last weekend in June).

Smallmouth bass catches were highest for anglers who fished out of Hoover's Marina (Table 5). Fifty-four percent of the total catch was taken from this site (43.6 % of the total harvest). Turkey Point Marina catches made up 17.7 % of the total catch and 24.5 % of the total harvest, anglers fishing out of Long Point Provincial Park caught 4.5 % of the total catch and 8.7 % of the total harvest, and those fishing out of Sugarloaf Marina caught 7.8 % of the total catch and 5.2 % of the total harvest. All other sites contributed smaller amounts to total catch and total harvest.

The CUE estimate for smallmouth bass over all months (Table 2) was 0.4 fish/rod-hour when all anglers were combined, and 0.8 fish/rod-hour for those anglers that targeted smallmouth bass. CUEs were highest in June, followed by July, then August. CUEs were highest out of Hoover's Marina (1.9 fish/rod-hour for all anglers and 2.1 fish/rod-hour for target anglers). Anglers out of Fort Erie had the second highest CUE for smallmouth bass (0.9 fish/rod-hour for all anglers and 1.1 fish/rod-hour for target anglers) even though overall catches were low. A few other sites had comparative CUEs, these included Long Point Provincial Park (0.8 fish/rod-hour for all anglers and 1.1 fish/rod-hour for target anglers), Old Cut Boat Livery (0.5 fish/rod-hour for all anglers and 0.7 fish/rod-hour for target anglers), and Turkey Point Marina (0.4 fish/rod-hour for all anglers and 0.6 fish/rod-hour for target anglers).

Rainbow Trout

Although catches of rainbow trout were relatively low (estimated total of 807 fish), the fishery improved as the summer progressed. Twenty-three percent of the total catch was landed in June, 26.4 % was landed in July, and 50.5 % was landed in August. Harvest estimates were very similar, with 23.7 % taken in June, 24.4 % taken in July, and 51.9 % taken in August.

Anglers caught 33.6 % of the observed total catch out of Port Dover Marina and 38.3 % out of Hoover's Marina (Table 6). Thirty–nine percent of the total harvest came out of Port Dover Marina, and 34.5 % came out of Hoover's Marina. Long Point Provincial Park landings contributed 17.8 % of the total catch and 15.5 % of the total harvest. Turkey Point Marina, Lowbanks Marina, and Sugarloaf Marina made up the remaining portion of the total catch and harvest. There were no reports of rainbow trout catches from any of the other sites.

CUEs for all months combined were very low for all anglers (0.003 fish/rod-hour) but noticeably better for those who targeted rainbow trout (0.08 fish/rod-hour). Fishing success in June for all anglers was 0.001 fish/rod-hour (0.04 fish/rod-hour for target anglers), 0.003 fish/rod-hour in July (0.2 fish/rod-hour for target anglers), and 0.003 fish/rod-hour in August (0.06 fish/rod-hour for anglers targeting rainbow trout).

The highest fishing success came from anglers fishing out of Long Point Provincial Park (0.02 fish/rod-hour for all anglers and 0.3 fish/rod-hour for target anglers), Port Dover Marina (0.009 fish/rod-hour, 0.1 fish/targeted rod-hour), and Hoover's Marina (0.008 fish/rod-hour, 0.06 targeted rod/hour; Table 6).

Biological Sampling Analysis

Biological data were collected from the following species: yellow perch, smallmouth bass, walleye, all salmonine species, white perch, and largemouth bass. Stomachs were removed from walleye and salmonines only. See Table 7-9 for a summary of the results.

Yellow Perch

One-hundred and eighty-seven yellow perch were sampled during the survey from all areas over all months. Sixty-nine percent of those sampled came from Area 10. The mean total length of yellow perch varied across areas and months (Figure 3a). The largest yellow perch were caught in Area 9 where there was little variation between mean values from June and July (288 and 290 mm; respectively), no Area 9 samples collected in August. Areas 10 and 11 showed little variation between months as well, with the highest mean lengths occurring in August for both sites. Area 8 showed the most variation in mean length between months, with June, July and August having mean lengths of 244, 289 and 265 mm; respectively. Overall, the largest individual yellow perch was sampled in Area 10 and measured 335 mm (see Figure 4a for distribution of length classes in the whole basin over the entire survey).

The mean weight of yellow perch (Figure 3b) followed the pattern observed for mean length. The only notable exception was in Area 8; while the mean length of yellow perch caught in Area 8 decreased from July to August, the mean weight increased slightly. Overall, the heaviest individual yellow perch was sampled in Area 8 and weighed 650 g.

The mean age of all yellow perch sampled was 4.6 years (see Figure 4b for distribution of ages in the whole basin over the entire survey). Figure 3c shows that the mean ages of fish caught in Areas 8, 9, and 10 were higher than the mean ages from Area 11 (including those caught from the Grand River access points). While the mean age of the yellow perch from most areas remained fairly constant over the survey, the mean age from Area 8 was markedly higher in July than in June or August. In general, the older fish were found to be in Area 8 (overall # = 4.8 years) and the younger fish were in Area 11 (overall # = 3.9 years), which corresponds roughly to the length and weight data (Figure 3c).

Walleye

One-hundred and nineteen walleye were sampled over the three months of the survey. Most of these came from Area 11 (65.6%) or the Grand River (31.5%). Three fish were sampled from Area 9. Figure 5a considers the mean total length of walleye caught in the Grand River separately from the rest of Area 11, and shows that although there was little change over time, the walleye caught in Area 11 (overall # = 629 mm) were longer than those caught in the Grand River (overall # = 440 mm; see Figure 6a for distribution of Grand River length classes). The three fish from area 9 were larger than those from the other two areas (# = 700 mm)

Mean weight estimates (Figure 5b) corresponded with the mean total length estimates described above; the walleye caught in the Grand River were much smaller (# over all months= 901 g) than those caught in the rest of Area 11 (# over all months= 2462 g). Similarly, the mean age of fish

caught in the Grand River (# over all months= 3 years) was less than that of fish caught in the rest of Area 11 (# over all months= 8 years, Figure 5c). The most abundant Grand River year class was from 2001 (age two fish; Figure 6b). The mean age of the three fish from Area 9 was 9.7 yrs.

The largest walleye (by weight) sampled during this survey weighed 4545 g, measured 740 mm in total length, and was caught in Area 9.

Smallmouth Bass

A total of 166 smallmouth bass were sampled from Areas 8, 10 and 11 (no smallmouth bass sampled in the Grand River). The mean length of smallmouth bass catch decreased from June to July in Areas 8 and 10, only to increase in Area 10 from July to August (Figure 7a). The opposite was found in Area 11, mean total lengths increased slightly from June to July, then decreased slightly from July to August. Overall, mean total lengths were highest in Area 11 (# over all months= 372 mm) and lowest in Area 10 (# over all months= 322 mm; see Figure 8a for distribution of length classes from the whole basin over the entire survey).

The mean weight observed for smallmouth bass followed the same trend as mean total length (Figure 7b). Overall, the mean weight was highest in Area 11 (# over all months= 869 g) and lowest in Area 10 (# over all months= 507 g).

Mean age of smallmouth bass showed an overall decrease in all areas from month to month, except for Area 11 where there was an increase in mean age caught in July (Figure 7c). Overall, the oldest fish caught were from Area 11 (# over all months= 4.9 years) and the youngest were from Area 10 (# over all months=3.9 years; see Figure 8b for distribution of ages from the whole basin over the entire survey). The largest smallmouth bass (by weight) sampled in the survey was 2117g, measured 500 mm in total length, and was caught in Area 11.

Salmonids

Rainbow trout were sampled from Areas 8, 10, and 11 (n=10). The average total length was 617.7 mm, with an average weight of 2510 g, and an average age of 2.7 years. Two lake trout were sampled from Area 11. Their total lengths were 615 mm and 605 mm, their weights were 2872 g and 2738 g, and they were both 4 years old.

Other Species

All white perch sampled came from Area 10 (n=13). They had a mean total length of 278.7 mm, mean weight of 285 g, and a mean age of 2.5 years. Largemouth bass were sampled from Area 8 (n=10) ,and they had a mean total length of 311.5 mm, mean weight of 449 g, and a mean age of 3.7 years.

Diet Analysis

Stomach analysis was limited because most anglers were reluctant to have the stomachs removed from their fish. All of the data reported in this section is a combination of all months (June, July, and August) and all locations.

Four coho salmon stomachs were removed and analyzed during the survey. Of the four stomachs, one was empty and the other three contained unidentifiable fish remains. The average number of prey items in the stomachs was 2.7, and the average total volume of these prey items was 4.3 ml.

Nine rainbow trout stomachs were removed and analyzed during the survey. The rainbow trout sampled had eaten a variety of prey taxa, including unidentifiable fish, identifiable fish (e.g. yellow perch, smelt, and emerald shiners), unidentifiable invertebrates and identifiable invertebrates such as spiny-tailed water fleas, *Bythotrephes cederstroemi*. Emerald shiners were the most common identifiable fish; found in four of the nine stomachs (On average there were 2.5 shiners occupying 4.1 mL partial volume per stomach). The average total length of the eight individual shiners which were found whole was 94.5 mm. One stomach had two smelt that had an average partial volume of 3.3 ml, and one stomach had one yellow perch that had a partial volume of 2.0 ml. On average, six stomachs had the remains of four unidentifiable fish that had an average partial volume of 1.8 ml. One stomach contained 46 spiny-tailed water fleas the total volume of which was 0.2 ml.

Most of the 51 walleye stomachs analyzed were empty (n=39). Eight stomachs contained an average of 1.1 unidentifiable fish that had an average partial volume of 1.3 ml. Three stomachs contained an average of 1.3 adult smelt that had an average partial volume of 1.3 ml. The average standard length (tip of the head to the base of the caudal peduncle) obtained from the four smelt present was 66.5 mm. One walleye stomach was found to contain 15 spiny-tailed water fleas that had a partial volume of 0.1 ml.

Angler Profile

Most anglers were still fishing (28.5 %), drift fishing (21.0 %), or used a combination of techniques (20.7 %; Table 10). Most angling parties originated (Table 11) locally (49.4 %) or from just outside the immediate area (within Ontario; 48.1 %). Eighty-five percent of angling parties were permanent residents (Table 12), followed by 12 % who were day trippers.

Area Estimates

Access points from the 2003 survey were grouped into areas (Table 1), to facilitate comparisons between years. Historical summaries are presented in Tables 13 (walleye and smallmouth bass) and 14 (yellow perch and rainbow trout).

In 2003, most (99.1%) of the yellow perch were caught in Area 8 and 10 (Port Dover/Nanticoke area and Inner Bay); the remainder was caught in Area 11 (Port Maitland and Port Colborne area). These results indicate that there is a distinct and focused yellow perch fishery in the western part of the basin. Figure 9 illustrates the historical trend in targeted CUE from 1990 to present day. CUEs have increased in combined area 8-9-10, but remained relatively constant in area 11, the noticeable exception being the doubling of the area 11 CUE in 1998.

The opposite pattern was observed with walleye as most (83.9 %) of the total catch of walleye was taken out of area 11, which can be broken down into 38.7 % caught by anglers fishing out of the Grand River, and 45.2 % caught by anglers fishing around Port Colborne. Of the remainder, 9.8 % was caught in area 8, and 6.7 % was caught in area 10. These results indicate that there is a distinct and focused fishery for walleye in the eastern part of the basin. Figure 10 illustrates targeted CUE trends over time. Estimates increased in both combined area 8-9-10 and area 11 compared to 1998.

Fifty-four percent of the total smallmouth bass catch estimate was landed by anglers fishing in area 10. Twenty-nine percent was caught in area 8, 16.1 % in area 11 and 1.3 % in area 12 (Niagara River). Compared to previous years, targeted CUEs experienced an increase in combined area 8-9-10, while remaining relatively constant in area 11 (Figure 11).

Of the estimated 806 rainbow trout caught throughout the summer, 71.9 % were caught in area 10, 24.2 % in area 8, and 4.0 % in area 11. Targeted CUE estimates were slightly lower in combined area 8-9-10 compared to 1998, but still considerably higher than in pre-1998 years (Figure 12). Targeted CUE in area 11 was noticeably lower than in any of the previous years surveyed (Figure 12).

Walleye Cap Area

The eastern portion of the eastern basin rehabilitation zone, defined as the walleye cap area, has been recognized as an important habitat for eastern basin stocks of walleye. Since 2000, conservative harvest limits for commercial fishermen have been set in place in this area, separating it from the remaining, more western portion of the basin (defined as the non-cap area). The border that separates these two areas lie between grid numbers 84 and 85 (see Figure 1b). The data collected during the access creel survey was expanded to produce estimates for the two areas. Anglers fishing in the western (non-cap) area of the rehabilitation zone fished an estimated 3,993 rod-hours, caught 520 walleye, and harvested 495 with a targeted CUE of 0.135 fish/rod-hour (all anglers CUE= 0.002 fish/rod-hour; Figure 13). Anglers fishing in the eastern, walleye cap, area of the zone fished an estimated 26,883 rod-hours and caught 2,711 walleye, 84 % of the total estimated catch. An estimated 2,147 walleye were harvested from this area with a targeted CUE of 0.121 fish/rod-hour (all anglers CUE= 0.06 fish/rod-hour; Figure 13).

Yellow Perch Cap Area

The yellow perch cap area, implemented in 2000, was similarly intended to limit fishing for yellow perch in the eastern end of the basin, an area where smaller, less productive stocks were believed to occur. The boundary line was located between grid numbers 87 and 88 (see Figure 1b). The spatial distribution of yellow perch catch and harvest was the reverse of what was observed for walleye. Anglers caught 99 % of the total catch for yellow perch in the western (non-cap) area, investing 64,444 rod-hours. An estimated 117,591 yellow perch were caught and 86,454 were harvested out of this area, with a targeted CUE of 1.9 fish/rod-hour (all anglers CUE= 0.6 fish/rod-hour; Figure 14). The remaining 1 % was caught in the eastern yellow perch cap area. An estimated 817 yellow perch were caught and 328 were harvested, with a targeted CUE of 0.278 fish/rod-hour (all anglers CUE= 0.03 fish/rod-hour; Figure 14).

Low Activity Sites

Individual estimates of catch and harvest were not obtained from some of the low traffic sites located around the eastern basin. Interviews were not conducted at these sites. Although activity counts were obtained from all sites, these counts include both fishing and recreational activity, and we are unable to adjust the counts to remove the proportion of recreational based activity. With this in mind, Table 15 illustrates the distribution of activity, which allows for comparisons to be made between interview sites and non-interview sites.

Long Point Bay Roving Creel Survey

The fishery estimates presented in this section are based on data collected from a survey conducted independently from the access point survey described above. The roving creel survey is conducted every year from the last Saturday in June to July 31, in three areas (1. Old Cut to St. Williams, 2. St. Williams to Turkey Point, 3. Pottohawk Point to Old Cut; Figure 15) in the Inner Bay of Long Point Bay. These areas correspond roughly to Area 8 of the present survey.

Total angling effort was estimated to be 76,669 rod-hours. Eighty-nine percent of the targeted effort was for smallmouth bass (Table16), 21 % was for yellow perch (Table 17), 7 % was for largemouth bass (Table 16) and 4 % was for northern pike. There were 36,865 smallmouth bass caught and 26,529 harvested. Anglers targeting smallmouth bass caught 0.5 fish/rod-hour. There were 10,175 yellow perch caught, with 4,883 of those harvested. The catch per unit effort for anglers targeting yellow perch was 0.6 fish/rod-hour. There were 6,134 freshwater drum caught, although only 17 of those were harvested. There were 2,599 rock bass (Table 17) caught and 256 harvested (targeted CUE= 0.3 fish/rod-hour), 2,105 largemouth bass caught and 397 harvested (targeted CUE= 0.3 fish/rod-hour), and 911 northern pike caught and 518 harvested (targeted CUE= 0.2 fish/rod-hour).

Even though there has been a slight increase in fishery estimates reported in 2003 compared to those in 2002, there has been a significant decrease in catch estimates for all species since 1998 (Ontario Ministry of Natural Resources, 2004).

Tournament Harvest

There were two significant walleye tournaments in 2003, the 4-4-4 (A. Marenelli, Port Colborne, Ontario, pers. comm.) and the CanAm (P. Leavere, Port Colborne, Ontario, pers. comm.), both were held out of Sugarloaf Marina in Port Colborne. The CanAm tournament was held June 28-29 with 49 teams (29 Canadian and 20 American) taking part. Participants recorded a total harvest of 374 walleye weighing a total of 1147.19 kg. The 4-4-4 tournament was held August 9-10 with 121 teams taking part. Participants recorded 823 walleye with a total weight of 2,278.15 kg. These numbers underestimate the total harvest associated with both tournaments because they do not include pre-tournament fishing or any unreported catches during the tournaments (i.e., small individuals).

Combining the results from both tournaments, there were, minimally, 1,197 additional walleye harvested from the eastern basin over the summer.

Discussion

Success rates (CUEs) for yellow perch, estimated from the 2003 access creel survey, for combined area 8-9-10, and area 11, were significantly lower than those reported by anglers taking part in the OMNR's angler diary program. Smallmouth bass creel and diary CUE estimates were similar, while creel estimates for walleye CUE were higher in combined area 8-9-10 but similar to diary estimates in area 11 (Figure 16). These differences may be due to a variety of factors. The diary program produced estimates that were based on 616 trips made by 116 anglers (Ontario Ministry of Natural Resources, 2004). These trips could have occurred any time throughout the year, while the access survey only collected data in the summer (June, July, and August), and estimates were based on 705 trips by an unknown number of anglers.

Another important difference is that these two groups are made up anglers with varying degrees of angling skill. For example, we would expect the group of diarists to contain more highly skilled anglers compared to the group taking part in the access creel survey (where a broader range of skill levels might be expected). Highly skilled anglers would have higher catch rates than those with less experience, which might have been the case with those anglers targeting yellow perch (season open year around). The smallmouth bass estimates may be more similar because bass season is only open for five months and most bass fishing takes place during end of June and July.

Yellow perch and smallmouth bass catch estimates from the Long Point Bay Roving Creel Survey were significantly lower than the CUEs reported from both the access creel and the diary program (Figure 16). The main difference between this survey and the other two programs is that it was only one month (end of June to the end of July), and it targeted the opening of bass season. The other difference is that the estimate produced for the roving creel only encompasses Long Point Bay while the other estimates are combined areas. If we dissect the access creel and diary estimates down to the same area as the roving creel, the numbers are much more comparable for access creel and roving creel for smallmouth bass (access creel= 0.71/rd-hr, roving creel= 0.53/rd-hr).

It has become evident that the two Eastern Basin walleye tournaments are important factors that need to be taken into account when trying to access the effect of the sport fishery on walleye populations in this area of the lake. In 2003, the minimum number of walleye harvested during these tournaments equaled 45 % of the total number of walleye harvested in the entire eastern basin in three months.

Ecological Perspective

The eastern basin of Lake Erie has been classified as deep and dimictic, separating it from the shallow, polymictic western basin and shallow, dimictic central basin (Ryan et al. 1999). The eastern basin has an average depth of 24.4 m and a maximum depth of 64.0 m (Hartman 1972). The construct of the eastern basin results in an environment suitable for a variety of species, many of which have become a valuable part of the commercial and sport fisheries on the lake.

Historical data have shown that intensive fishing has been occurring on Lake Erie since the mid-1800's (Regier et al. 1969). By the 1960's the composition of the eastern basin fish community had experienced drastic changes (Ryan et al. 1999). The cause for these changes has been linked to a variety of factors, commercial fishing, sport fishing, changes in the trophic structure, the introduction of exotic species, and changes in nutrient levels (Ryan et al. 1999). The effects of these factors are still being felt today, all of which continue to contribute to an instable system.

One of the most important observations that can be concluded from the results stated in this report is that abundances of walleye, yellow perch, salmonids, and smallmouth bass continue to fluctuate. The distribution of effort, catch/harvest and CUE for each of these target species correspond to habitats conducive to reproductive success, availability of prey, and appropriate temperature ranges. In general, the eastern basin of Lake Erie can be divided into six distinct habitats: the area around the tip of Long Point, the Inner Bay of Long Point Bay, the area around Port Dover and Nanticoke, the Grand River, the area around Port Colborne, and the Niagara River.

Adult yellow perch are present over a wide-range of depths (Lane et al. 1996). Spawning occurs in shallow water along shorelines and in tributaries in the spring when the water temperature falls in the range of 2-18.6 ºC (Hokanson 1977). A report by Goodyear et al. (1982) identified the Inner Bay, areas around Port Dover and Nanticoke, and areas around Point Abino as important spawning and nursery grounds for yellow perch in the eastern basin due to the shelter and food availability in these areas (MacGregor and Witzel 1987). Based on this information, it is not surprising that these were the areas found to have reported the highest catches (38 % came from anglers who launched their boat from Port Dover Marina) of yellow perch for the summer of 2003.

Adult walleye tend to occupy shallow depths for most of the year, moving into deeper waters in the summer (Lane et al. 1996). Walleye spawn in late spring in water temperatures of around 4-13 ºC (Wismer and Christie 1987). Spawning areas in the Inner Bay and the Grand River have been identified (Goodyear et al. 1982). The survey results support these observations, as 76 % of the walleye caught came from the eastern end of the basin (Port Colborne, Dunnville, Port Maitland, and the Grand River areas). One explanation that may explain fluctuations in walleye

abundances in the eastern basin is the influence of western basin walleye stocks on eastern basin abundances. It has been observed that western basin walleye stocks contributed up to 63 % to the recreational fishery in the eastern basin in mid-1990's (Gatt et al. 2003). Additional information has suggested that that percentage of western contributions has actually decreased in more recent years (OMNR; Wilson et al., in prep).

The shallow protected waters of the Inner Bay and the north shore of Long Point provide favorable spawning and rearing habitat, which is probably why species like smallmouth bass migrate there from outside (Hamley and MacLean 1979). Spawning grounds have been identified in the Inner Bay, as well as along the shoreline of the Grand River to Fort Erie (Goodyear et al. 1982). Tag recapture studies have shown that adult smallmouth bass migrate each spring along the north shore from Nanticoke, westward to spawning areas in or near the Inner Bay (Hamley and MacLean 1979). Young-of-the-year smallmouth bass have been collected at several areas near the Inner Bay and Nanticoke (Goodyear et al. 1982), and in Port Colborne (Gravelly Bay), Point Abino, and the Niagara River (OMNR; T. MacDougall unpublished data). Survey results indicate that 54 % of the total estimated catch was landed out of Hoover's Marina in Nanticoke, and smaller amounts were scattered throughout the Inner Bay and around Port Colborne, which corresponds to the historical information provided above.

Adult rainbow trout live in deep water year around, except in the winter when they move to shallower depths (Lane et al. 1996). Spawning populations of rainbow trout have been isolated to tributaries running into the Inner Bay and the Grand River (Goodyear et al. 1982). Most of the catch (72 %) in 2003 came from anglers fishing out of Port Dover Marina and Hoover's Marina in Nanticoke, although small amounts came out of Long Point Provincial Park and Turkey Point (in the Inner Bay), and out of Lowbanks Marina and Port Colborne (eastern end of the basin).

To summarize, there continues to be a targeted fishery for yellow perch in the western end of the eastern basin, and a targeted fishery for walleye in the eastern end of the basin. Smallmouth bass seem to be in high densities around Nanticoke as well as in the Inner Bay. These results support the idea that there may be one genetic stock migrating between the two areas (MacGregor and Witzel 1987). All of these observations will be useful when making decisions on how to manage these stocks for the future, but of significant importance is the fact that the fisheries in Lake Erie have not stabilized, and abundances fluctuate a great deal over time. The instability is due to a variety of factors that are difficult to understand and control. This alone is an important factor in determining how stocks should be managed for future sustainability.

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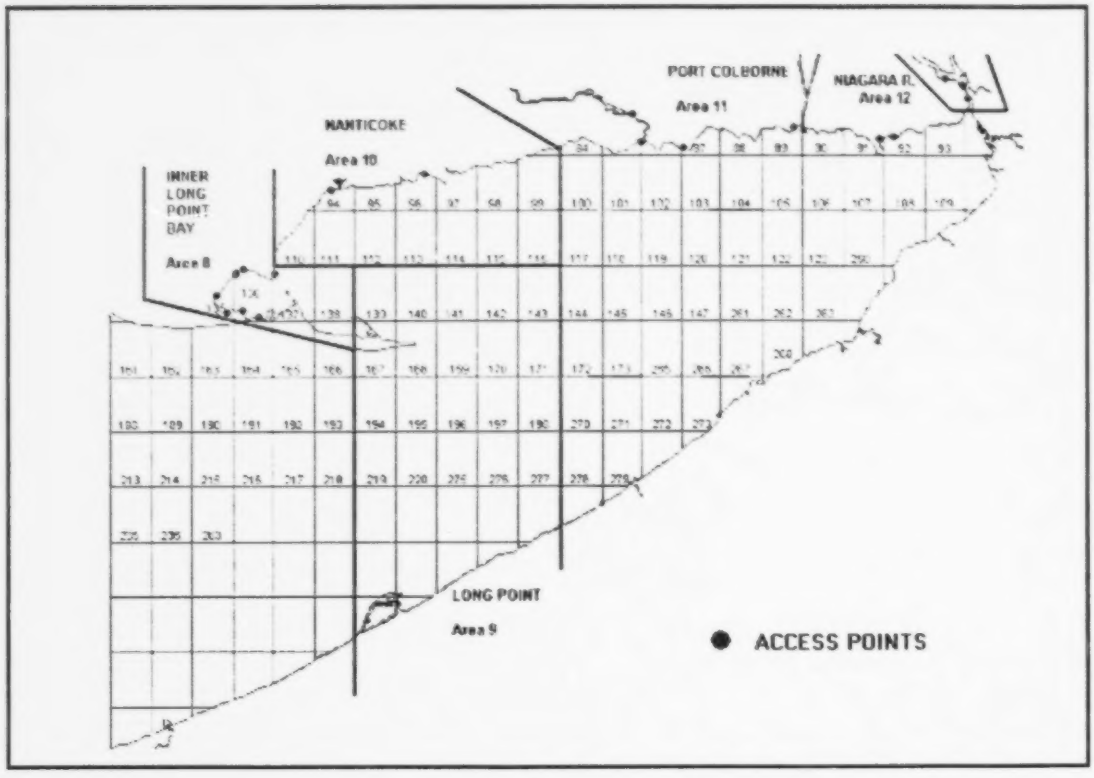


Figure 1a. Map of the Eastern Basin of Lake Erie, outlining access points where interviews were conducted, fishing areas, and fishing grids.

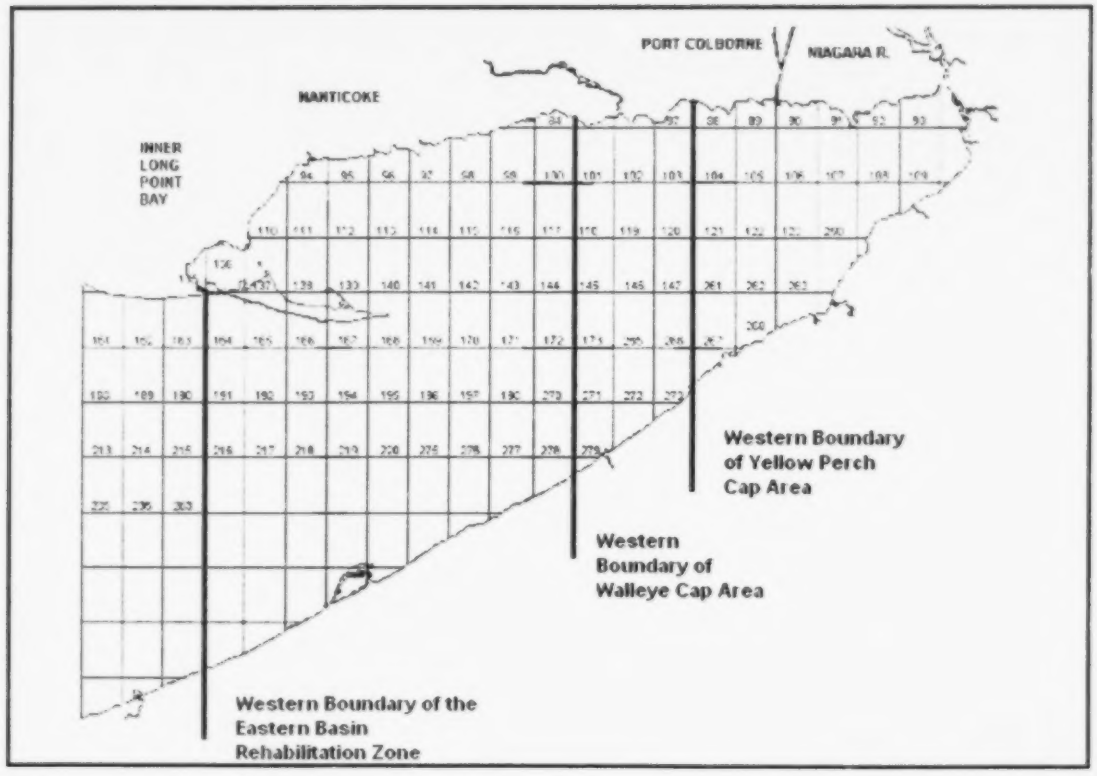


Figure 1b. Map of the Eastern Basin of Lake Erie, outlining the western boundaries for the rehabilitation zone, the walleye cap area, and the yellow perch cap area.

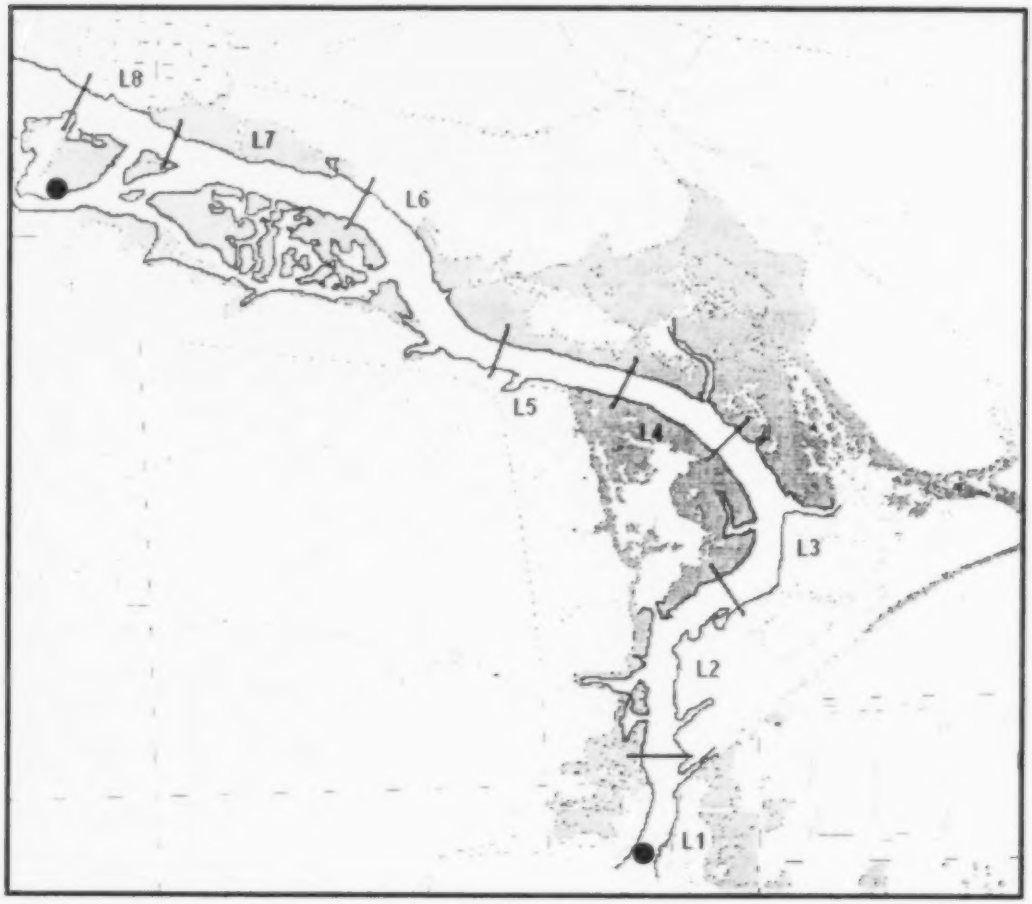


Figure 1c. Map of the Grand River outlining fishing divisions (L1-L8, identified for survey purposes) and access points (●).

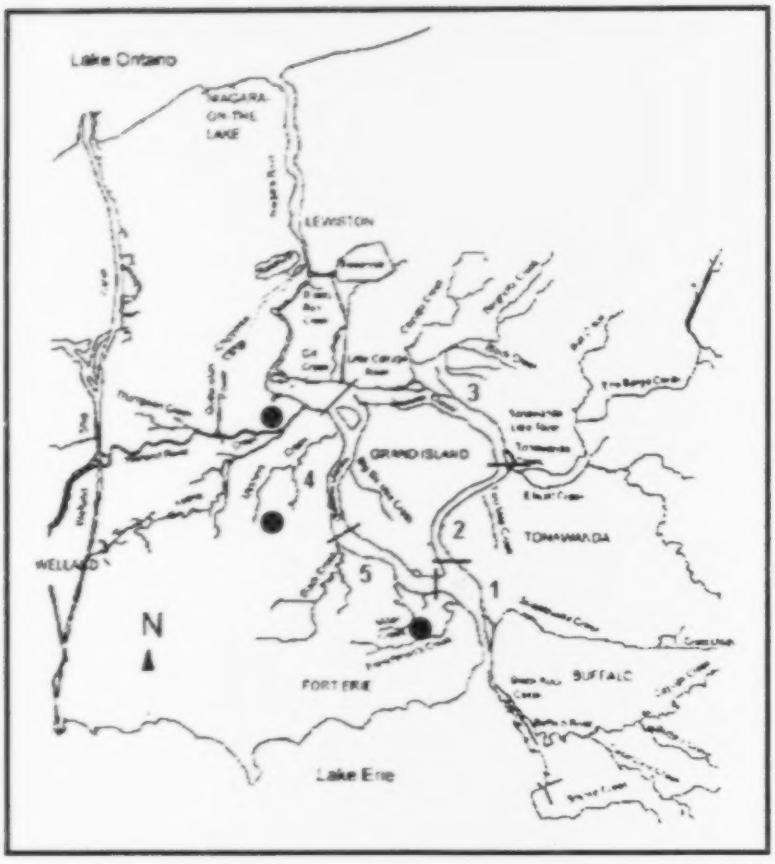


Figure 1d. Map of the Niagara River outlining fishing divisions (1-5, identified for survey purposes) and access points (●).

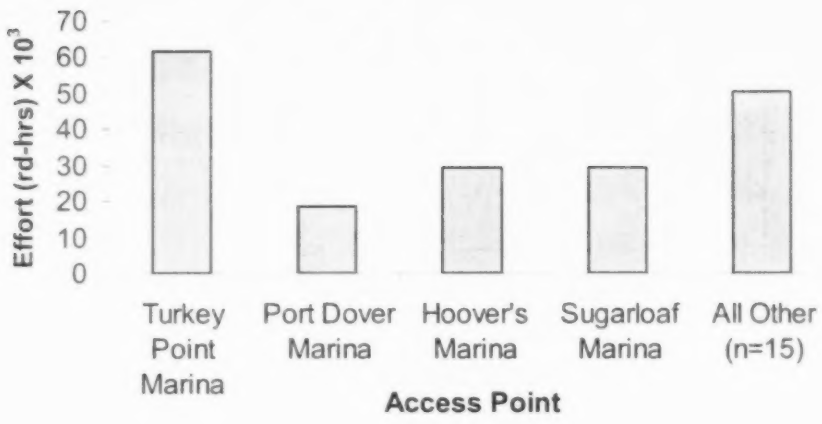
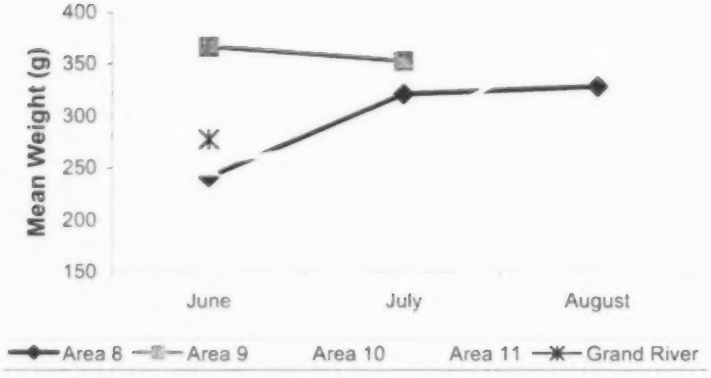


Figure 2. Distribution of angling effort (rod hours) between access points in the Eastern Basin.

(a)

(b)



(c)

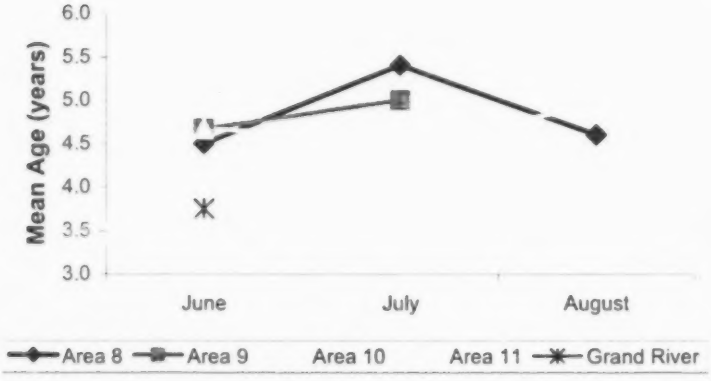
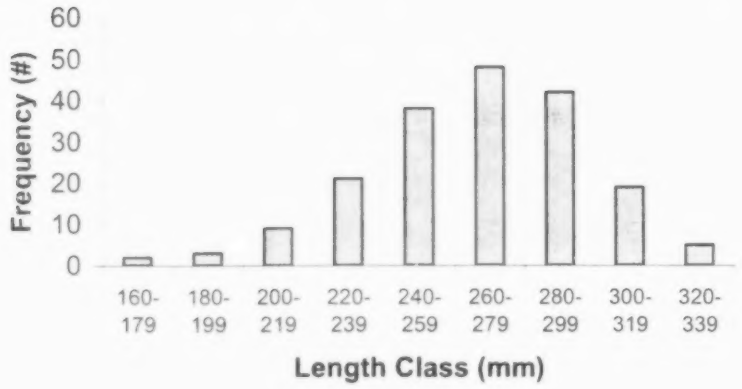


Figure 3. (a) Mean total length (mm), (b) mean weight (g), and (c) mean age (years) of yellow perch from areas where sufficient data were collected from June to August 2003.

(a)



(b)

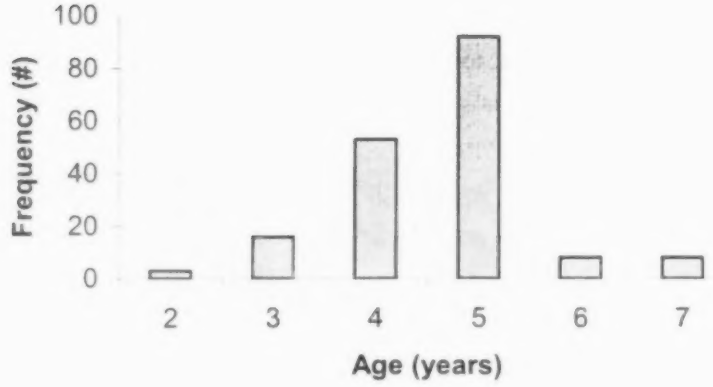
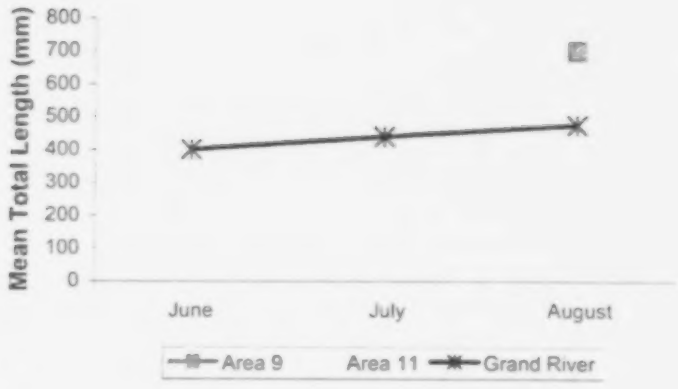
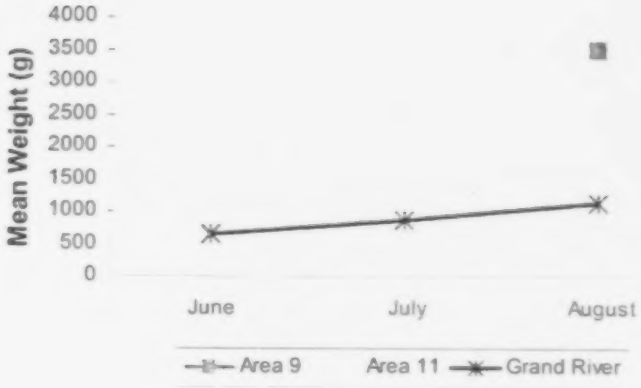


Figure 4. (a) Length composition (n=187) and (b) age composition (n=180) of yellow perch caught in the eastern basin from June to August 2003.

(a)



(b)



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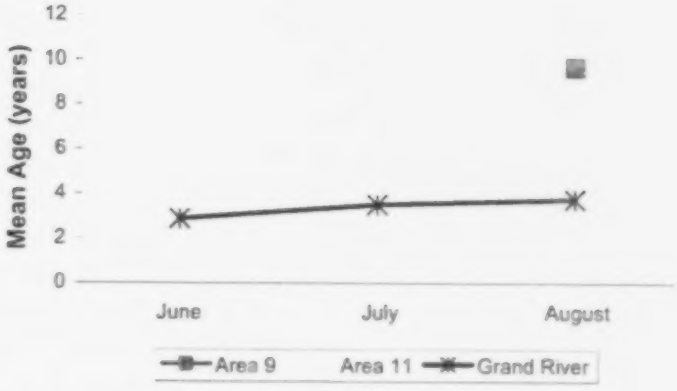
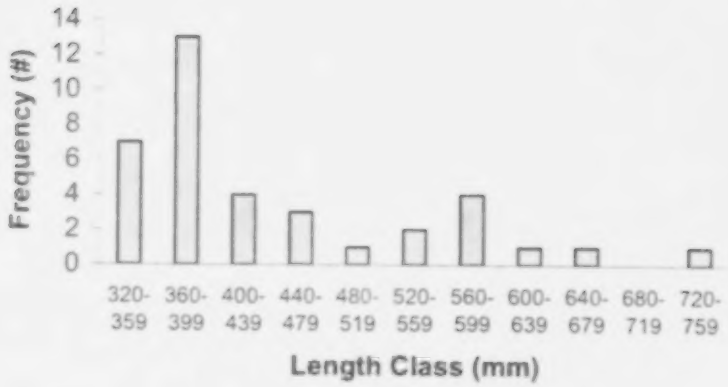


Figure 5. (a) Mean total length (mm), (b) mean weight (g), and (c) mean age (years) of walleye caught in areas where sufficient data were collected from June to August 2003.

(a)



(b)

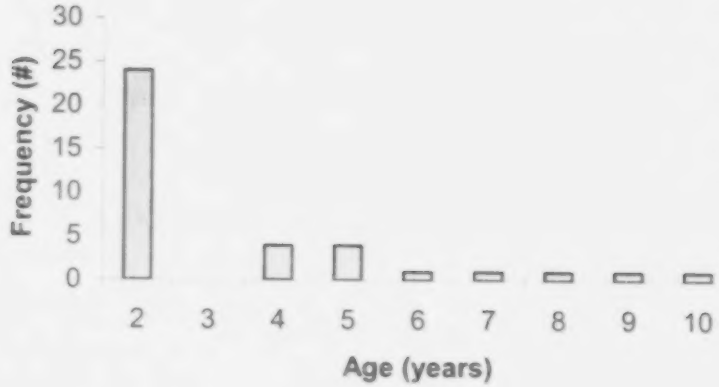
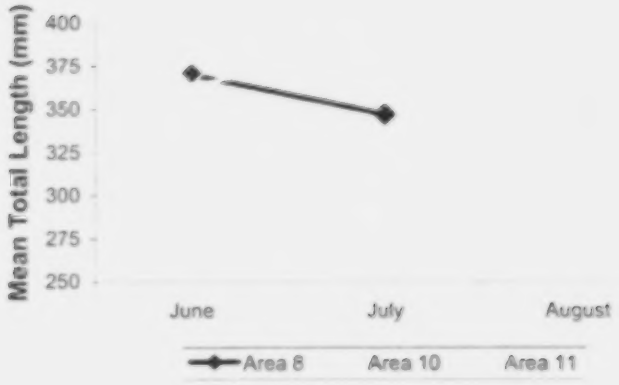


Figure 6. (a) Length composition and (b) age composition of walleye caught in the Grand River from June to August 2003 (n=37).

(a)



(b)

(c)

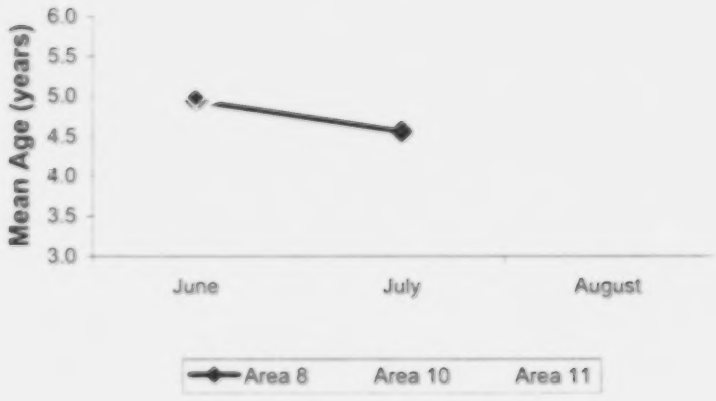
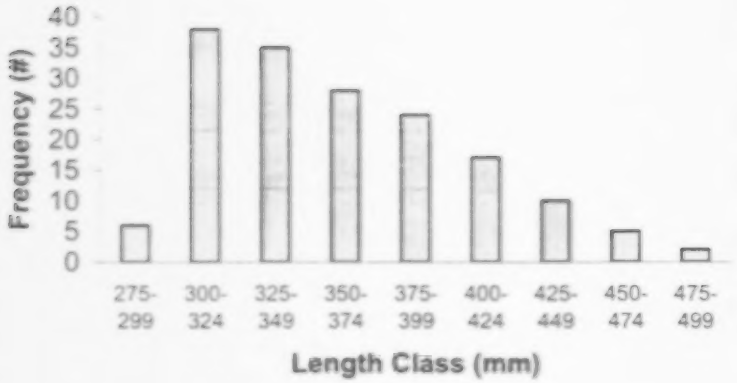


Figure 7. (a) Mean total length (mm), (b) mean weight (g), and (c) mean age (years) of smallmouth bass caught in areas where sufficient data were collected from June to August 2003.

(a)



(b)

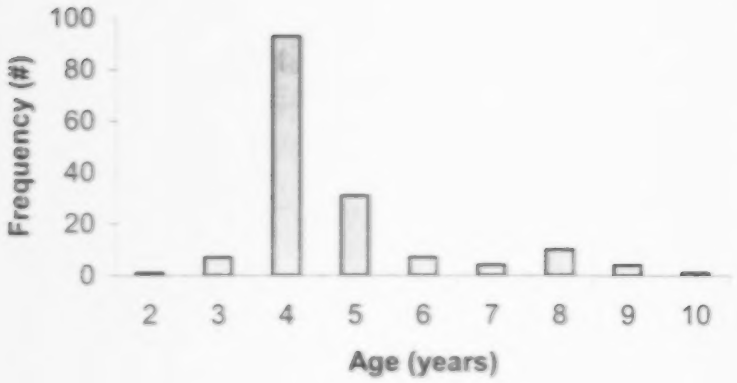


Figure 8. (a) Length composition (n=165) and (b) age composition (n=158) of smallmouth bass caught in the eastern basin from June to August 2003.

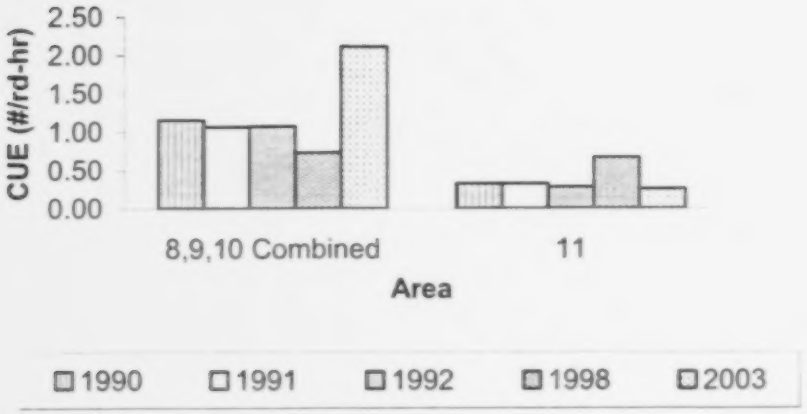


Figure 9. Catch per unit effort estimates for yellow perch from 1990-92, 1998 and 2003 (CUE calculations based on observed targeted catch/observed targeted effort).

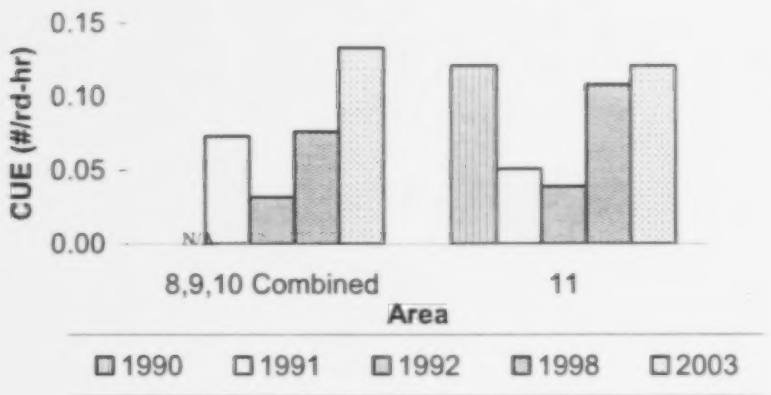


Figure 10. Catch per unit effort estimates for walleye from 1990-92, 1998 and 2003 (CUE calculations based on observed targeted catch/observed targeted effort).

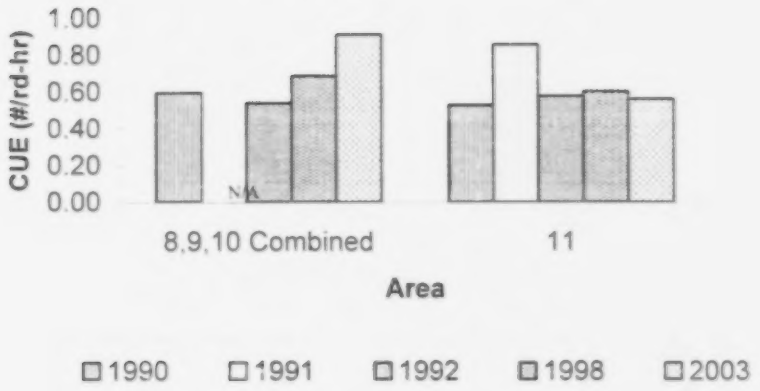


Figure 11. Catch per unit effort estimates for smallmouth bass from 1990-92, 1998 and 2003 (CUE calculations based on observed targeted catch/observed targeted effort).

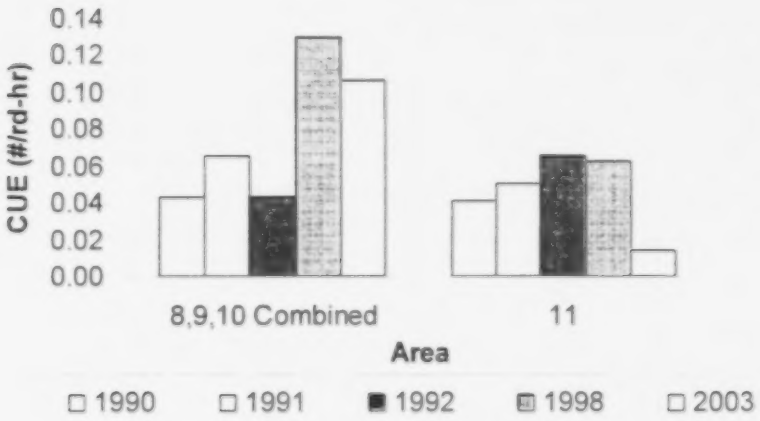


Figure 12. Catch per unit effort estimates for rainbow trout from 1990-92, 1998 and 2003 (CUE calculations based on observed targeted catch/observed targeted effort).

Figure 13. Comparisons of catch per unit effort estimates for walleye from the western and eastern regions of the rehabilitation zone (CUE calculations based on observed catch/observed effort).

Figure 14. Comparisons of catch per unit effort estimates for yellow perch from the western and eastern regions of the rehabilitation zone (CUE calculations based on observed catch/observed effort).

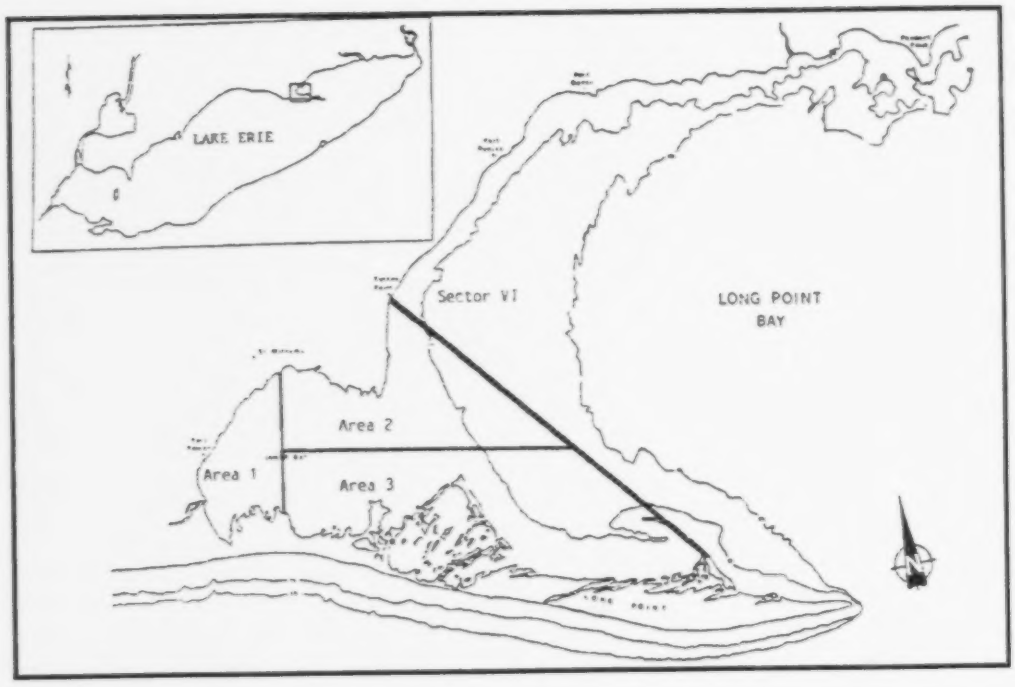


Figure 15. Study areas for Long Point Bay roving creel survey.

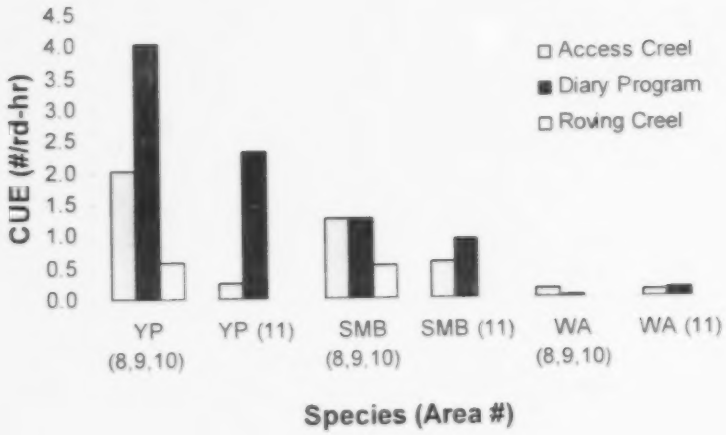


Figure 16. Comparison of CUE estimates by species and area from the Eastern Basin Access Point Creel Survey, the Angler Diary Program, and the LPB Roving Creel Survey (Area 8 only), 2003.

Table 1. Details concerning the access points used in the Eastern Basin Access Point Creel Survey.

Area	Access Point	Ramp Code	# Staff	Interviews Conducted	Camera Used	Creel Card Used	Boat Trailer Counts
8	Long Point Provincial Park	01	2	Yes	-	-	Yes
	Old Cut Boat	02		Yes	-	-	Yes
	Livery	03		-	-	-	Yes
	Post's Marina	04		-	-	-	Yes
	Marina Shores	05		-	-	-	Yes
	(big)	06		Yes	-	Yes	Yes
	Marina Shores (small)	07		-	-	-	Yes
	Sandboy Marina	08		Yes	-	-	Yes
	B&C Fisheries	09		-	-	-	Yes
	(Cronmillers)	10		-	-	-	Yes
	Port Rowan	11		-	-	-	Yes
	Harbour	12		-	-	-	Yes
	Bluebill Marina	14		Yes	Yes	Yes	Yes
	Shady Aker's	15		Yes	Yes	Yes	Yes
	Inner Bay Marina	16		Yes	Yes	Yes	Yes
	Hilltop Marina						
	Fin and Feather						
	Booth's Harbour						
	Turkey Point						
10	Port Dover	17		Yes	Yes	Yes	Yes
	Marina	18		Yes	-	-	Yes
	Port Dover Creek	19		Yes	Yes	Yes	Yes
	Hoover's Marina (Nanticoke)	20		-	-	-	Yes
	Knight's Beach Trailor Park	21		-	-	-	Yes

11	Port Maitland (west side of	22	2	Yes	-	-	Yes
	Grand R.)	23		Yes	-	-	Yes
	Grand Island						
	BBQ Ramp	24		-	-	-	Yes
	(Dunnville)	25		-	-	-	Yes
	Byng Park Ramp						
	Dunnville Boat Club Ramp	26		-	-	-	Yes
	Port Maitland (east side of	27		Yes	-	-	Yes
	Grand R.)	28		-	-	-	Yes
	Mohawk Marina						
	(Lowbanks)	30		Yes	Yes	Yes	Yes
	Long Beach						
	Conservation	31		Yes	-	-	Yes
	Area	32		Yes	-	-	Yes
	Sugarloaf Marina (Port Colborne)						
	Point Albino						
	Crystal Beach						
12	Fort Erie Marina	33		Yes	-	-	Yes
	Niagara Parkway	34		Yes	-	-	Yes
	Marina/Snackbar						
	Chippawa Boat Ramp	35		Yes	-	-	Yes

Table 2. Estimated angling effort, catch, harvest, and CUE from the Access Point Creel Survey, Eastern Basin, Lake Erie, June 2-August 31, 2003 (RSE= relative standard error).

Species	Targeted Effort (rd-hr)	% RSE	% Target	Est. Harvest (#)	% RSE	Est. Catch (#)	% RSE	% of Total Harvest	% of Total Catch	Obs. CUE (all)	Obs. CUE (Target)
Yellow Perch	66380	2	35	86782	8	118408	7	62.4	41.9	0.5	1.797
Smallmouth Bass	82121	3	43	24887	8	94170	7	17.9	33.3	0.438	0.783
White Bass	8094	1	4	13345	1	19080	0	9.6	6.8	0.054	1.779
Largemouth Bass	26332	8	14	781	34	13518	4	0.6	4.8	0.07	0.438
Round Goby	0		0	7640	18	12406	11	5.5	4.4	0.091	
Freshwater Drum	1505	18	1	641	43	7875	13	0.5	2.8	0.042	0.2
Bluegill	1461	0	1	316	22	5056	44	0.2	1.8	0.01	0.187
Rock Bass	2224	35	1	387	35	4966	7	0.3	1.8	0.026	0.269
Walleye	30876	7	16	2641	10	3231	9	1.9	1.1	0.028	0.121
Northern Pike	4749	11	3	156	13	1086	18	0.1	0.4	0.007	0.113
Rainbow Trout	9898	8	5	784	8	806	8	0.6	0.3	0.003	0.081
Channel Catfish	103	13	0	117	29	746	9	0.1	0.3	0.009	0.339
Coho Salmon	2201	23	1	246	13	246	13	0.2	0.1	0.001	0.093
Lake Trout	159	93	0	32	93	244	93	0.0	0.1	0.002	1.538
Chinook Salmon	3776	0	2	210	0	210	0	0.2	0.1	0	0.056
Longnose Gar	0		0	117	0	135	0	0.1	0.0	0	
Pumpkinseed	37	95	0	0		115	46	0.0	0.0	0.001	1.497
Common Carp	0		0	0		45	0	0.0	0.0	0	
White Sucker	0		0	0		44	23	0.0	0.0	0	
Brown Bullhead	0		0	0		32	0	0.0	0.0	0	
White Perch	0		0	0		24	0	0.0	0.0	0	
Black Bullhead	0		0	0		23	29	0.0	0.0	0	
Burbot	0		0	0		7	93	0.0	0.0	0	
Totals	239916		126	139082		282473		100.0	100.0		

NOTES:

Percent target is greater than 100% because some anglers targeted more than one species simultaneously.

Total estimated angling effort was 189,613 rod hours.

Observed CUEs (all) were calculated from observed catch/observed effort values from all anglers.

Observed CUEs (target) were calculated from targeted observed catch/ targeted observed effort values from anglers targeting specific species.

Table 3. Estimated angling effort, catch, harvest, and CUE for yellow perch for each access point from the Access Point Creel Survey, Eastern Basin, Lake Erie, June 2-August 31, 2003 (RSE= relative standard error).

Access Point	Targeted Effort (rd-hr)	% RSE	% Target	Est. Harvest (#)	% RSE	Est. Catch (#)	% RSE	% of Total Harvest	% of Total Catch	Obs. CUE (all)	Obs. CUE (Target)
Long Point Provincial Park	1938	7	30	4312	7	9671	7	5.0	8.2	1.021	4.325
Old Cut Boat Livery	2242	4	35	1434	0	2905	2	1.7	2.5	0.425	0.95
Sandboy Marina	569	0	11	220	0	706	1	0.3	0.6	0.122	1.048
Port Rowan Harbour	553	0	61	0		74	0	0.0	0.1	0.087	0.121
Fin and Feather	0		0	0		126	0	0.0	0.1	0.072	
Booth's Harbour	2491	3	35	1728	0	2714	2	2.0	2.3	0.305	0.811
Turkey Point Marina	21637	3	35	19136	11	24270	10	22.1	20.5	0.275	1.206
Port Dover Marina	16271	3	87	36271	5	45563	5	41.8	38.5	2.825	3.043
Port Dover Creek	531	31	92	312	40	356	38	0.4	0.3	0.622	0.673
Hoover's Marina	15841	7	54	22805	29	30911	23	26.3	26.1	1.161	2.2002
Port Maitland (West)	879	32	14	175	56	217	54	0.2	0.2	0.06	0.369
Dunnville BBQ	314	3	7	54	39	54	39	0.1	0.0	0.013	0.186
Lowbanks Marina	1177	8	20	8	87	24	87	0.0	0.0	0.016	0.077
Sugarloaf Marina	1307	29	4	306	75	560	53	0.4	0.5	0.026	0.364
Point Abino	495	0	40	22	0	215	15	0.0	0.2	0.197	0.044
Crystal Beach	24	0	1	0		0		0.0	0.0	0	0
Fort Erie Marina	110	95	13	0		42	95	0.0	0.0	0.049	0.381
Niagara Parkway	0		0	0		0		0.0	0.0	0	
Chippawa Boat Ramp	0		0	0		0		0.0	0.0	0	
Totals	66379			86783		118408		100.0	100.0		

NOTES:

Percent target is greater than 100% because some anglers targeted more than one species simultaneously.

Observed CUEs (all) were calculated from observed catch/observed effort values from all anglers.

Observed CUEs (target) were calculated from targeted observed catch/ targeted observed effort values from anglers targeting specific species.

Table 4. Estimated angling effort, catch, harvest, and CUE for walleye for each access point from the Access Point Creel Survey, Eastern Basin, Lake Erie, June 2-August 31, 2003 (RSE= relative standard error).

Access Point	Targeted Effort (rd-hr)	% RSE	% Target	Est. Harvest (#)	% RSE	Est. Catch (#)	% RSE	% of Total Harvest	% of Total Catch	Obs. CUE (all)	Obs. CUE (Target)
Long Point Provincial Park	286	0	4	26	13	26	13	1.0	0.8	0.004	0.077
Old Cut Boat Livery	0		0	0		0		0.0	0.0	0	
Sandboy Marina	0		0	0		0		0.0	0.0	0	
Port Rowan Harbour	0		0	0		0		0.0	0.0	0	
Fin and Feather	0		0	0		0		0.0	0.0	0	
Booth's Harbour	0		0	0		0		0.0	0.0	0	
Turkey Point Marina	1038	72	2	254	88	279	81	9.6	8.6	0.004	0.24
Port Dover Marina	960	0	5	137	0	137	0	5.2	4.2	0.003	0.143
Port Dover Creek	0		0	0		0		0.0	0.0	0	
Hoover's Marina	1710	0	6	77	0	77	0	2.9	2.4	0.001	0.045
Port Maitland (West)	3057	24	48	512	9	601	11	19.4	18.6	0.078	0.16
Dunnville BBQ	3683	8	83	414	9	649	3	15.7	20.1	0.145	0.179
Lowbanks Marina	1348	0	23	63	0	63	0	2.4	2.0	0.008	0.026
Sugarloaf Marina	17767	10	60	999	13	1212	14	37.8	37.5	0.052	0.09
Point Abino	660	0	53	143	0	143	0	5.4	4.4	0.103	0.217
Crystal Beach	320	0	16	16	0	43	0	0.6	1.3	0.034	0.1
Fort Erie Marina	48	0	6	0		0		0.0	0.0	0	0
Niagara Parkway	0		0	0		0		0.0	0.0	0	
Chippawa Boat Ramp	0		0	0		0		0.0	0.0	0	
Total	30877			2641		3230		100.0	100.0		

NOTES:
Percent target is greater than 100% because some anglers targeted more than one species simultaneously.
Observed CUEs (all) were calculated from observed catch/observed effort values from all anglers.
Observed CUEs (target) were calculated from targeted observed catch/ targeted observed effort values from anglers targeting specific species.

Table 5. Estimated angling effort, catch, harvest, and CUE for smallmouth bass for each access point from the Access Point Creel Survey, Eastern Basin, Lake Erie, June 2-August 31, 2003 (RSE= relative standard error).

Access Point	Targeted Effort (rd-hr)	% RSE	% Target	Est. Harvest (#)	% RSE	Est. Catch (#)	% RSE	% of Total Harvest	% of Total Catch	Obs. CUE (all)	Obs. CUE (Target)
Long Point Provincial Park	4216	13	65	2175	17	4275	12	8.7	4.5	0.766	1.063
Old Cut Boat Livery	2938	0	46	1501	0	2686	0	6.0	2.9	0.472	0.734
Sandboy Marina	495	78	10	110	76	395	66	0.4	0.4	0.066	0.733
Port Rowan Harbour	0		0	0		48	0	0.0	0.1	0.075	
Fin and Feather	1283	0	79	462	0	544	0	1.9	0.6	0.312	0.394
Booth's Harbour	3432	58	48	1029	95	2618	11	4.1	2.8	0.249	0.676
Turkey Point Marina	29010	3	47	6091	7	16631	9	24.5	17.7	0.363	0.574
Port Dover Marina	889	0	5	49	0	235	3	0.2	0.2	0.011	0.177
Port Dover Creek	208	49	69	29	46	29	46	0.1	0.0	0.051	0.141
Hoover's Marina	18082	1	61	10861	16	50359	13	43.6	53.5	1.89	2.147
Port Maitland (West)	3697	17	58	455	16	3937	22	1.8	4.2	0.525	0.945
Dunnville BBQ	798	5	18	27	0	143	0	0.1	0.2	0.035	0.186
Lowbanks Marina	4827	3	81	571	8	3085	1	2.3	3.3	0.466	0.592
Sugarloaf Marina	9347	7	32	1282	7	7356	5	5.2	7.8	0.182	0.409
Point Abino	361	49	29	117	63	245	30	0.5	0.3	0.221	0.309
Crystal Beach	1534	0	77	44	0	400	0	0.2	0.4	0.179	0.273
Fort Erie Marina	741	82	87	84	95	807	85	0.3	0.9	0.908	1.076
Niagara Parkway	77	95	100	0		0		0.0	0.0	0	0
Chippawa Boat Ramp	189	95	16	0		378	95	0.0	0.4	0.329	2
Totals	82124			24887		94171		100.0	100.0		

NOTES:
Percent target is greater than 100% because some anglers targeted more than one species simultaneously.
Observed CUEs (all) were calculated from observed catch/observed effort values from all anglers.
Observed CUEs (target) were calculated from targeted observed catch/ targeted observed effort values from anglers targeting specific species.

Table 6. Estimated angling effort, catch, harvest, and CUE for rainbow trout for each access point from the Access Point Creel Survey, Eastern Basin, Lake Erie, June 2-August 31, 2003 (RSE= relative standard error).

Access Point	Targeted Effort (rd-hr)	% RSE	% Target	Est Harvest (#)	% RSE	Est Catch (#)	% RSE	% of Total Havest	% of Total Catch	Obs. CUE (all)	Obs. CUE (Target)
Long Point Provincial Park	558	0	9	122	0	144	0	15.5	17.8	0.017	0.29
Old Cut Boat Livery	0		0	0		0		0.0	0.0	0	
Sandboy Marina	0		0	0		0		0.0	0.0	0	
Port Rowan Harbour	0		0	0		0		0.0	0.0	0	
Fin and Feather	0		0	0		0		0.0	0.0	0	
Booth's Harbour	0		0	0		0		0.0	0.0	0	
Turkey Point Marina	813	88	1	51	88	51	88	6.5	6.3	0.001	0.063
Port Dover Marina	2485	0	13	309	0	309	0	39.4	38.3	0.009	0.104
Port Dover Creek	0		0	0		0		0.0	0.0	0	
Hoover's Marina	4914	6	17	271	17	271	17	34.5	33.6	0.008	0.058
Port Maitland (West)	0		0	0		0		0.0	0.0	0	
Dunnville BBQ	446	0	10	0		0		0.0	0.0	0	0
Lowbanks Marina	683	0	11	21	0	21	0	2.7	2.6	0.003	0.031
Sugarloaf Marina	0		0	11	95	11	95	1.4	1.4	0.001	
Point Abino	0		0	0		0		0.0	0.0	0	
Crystal Beach	0		0	0		0		0.0	0.0	0	
Fort Erie Marina	0		0	0		0		0.0	0.0	0	
Niagara Parkway	0		0	0		0		0.0	0.0	0	
Chippawa Boat Ramp	0		0	0		0		0.0	0.0	0	
Totals	9899			785		807		100.0	100.0		

NOTES:

Percent target is greater than 100% because some anglers targeted more than one species simultaneously.

Observed CUEs (all) were calculated from observed catch/observed effort values from all anglers.

Observed CUEs (target) were calculated from targeted observed catch/ targeted observed effort values from anglers targeting specific species.

Table 7. Seasonal patterns in mean length (mm), mean weight (g) and mean age (years) of yellow perch harvested in the eastern basin of Lake Erie from June 2 to August 31, 2003. Numbers in brackets represent number sampled (n).

Area	Month	Mean Length (mm)	Mean Weight (g)	Mean Age (yrs)
All	All	263 (187)	275 (185)	4.6 (180)
All	June	260 (127)	251 (127)	4.6 (120)
Inner Bay	June	244 (7)	241 (7)	4.5 (6)
Long Point	June	288 (3)	367 (3)	4.7 (3)
Nanticoke	June	261 (102)	253 (102)	4.7 (96)
Port Colborne	June	250 (11)	199 (11)	3.9 (11)
Grand River	June	267 (4)	277 (4)	3.7 (4)
Niagara River	June	–	–	–
All	July	264 (26)	286 (26)	4.6 (26)
Inner Bay	July	289 (5)	321 (5)	5.4 (5)
Long Point	July	290 (2)	352 (2)	5.0 (2)
Nanticoke	July	261 (14)	287 (14)	4.6 (14)
Port Colborne	July	237 (5)	224 (5)	4.0 (5)
Grand River	July	–	–	–
Niagara River	July	–	–	–
All	August	273 (34)	362 (32)	4.8 (34)
Inner Bay	August	265 (10)	328 (10)	4.6 (10)
Long Point	August	–	–	–
Nanticoke	August	277 (22)	378 (22)	4.9 (22)
Port Colborne	August	264 (2)	–	4.0 (2)
Grand River	August	–	–	–
Niagara River	August	–	–	–

Table 8. Seasonal patterns in mean length (mm), mean weight (g) and mean age (years) of walleye collected in the eastern basin of Lake Erie from June 2 to August 31, 2003. Numbers in brackets represent number sampled (n).

Area	Month	Mean Length (mm)	Mean Weight (g)	Mean Age (yrs)
All	All	570 (119)	1984 (106)	6.5 (118)
All	June	466 (21)	1244 (21)	4.5 (21)
Inner Bay	June	–	–	–
Long Point	June	–	–	–
Nanticoke	June			
Port Colborne	June	664 (4)	2859 (4)	9.7 (4)
Grand River	June	402 (15)	648 (15)	2.9 (15)
Niagara River	June			
All	July	608 (48)	2283 (48)	7.5 (48)
Inner Bay	July	–	–	–
Long Point	July	–	–	–
Nanticoke	July			
Port Colborne	July	622 (37)	2377 (37)	7.8 (37)
Grand River	July	441 (6)	877 (6)	3.5 (6)
Niagara River	July			
All	August	578 (50)	2015 (37)	6.3 (49)
Inner Bay	August			
Long Point	August	700 (3)	3484 (3)	9.7 (3)
Nanticoke	August			
Port Colborne	August	612 (31)	2396 (18)	7.0 (30)
Grand River	August	475 (16)	1148 (16)	3.7 (16)
Niagara River	August			

Table 9. Seasonal patterns in mean length (mm), mean weight (g) and mean age (years) of smallmouth bass collected in the eastern basin of Lake Erie from June 2 to August 31, 2003. Numbers in brackets represent number sampled (n).

Area	Month	Mean Length (mm)	Mean Weight (g)	Mean Age (yrs)
All	All	361 (166)	792 (164)	4.6 (159)
All	June	356 (43)	751 (43)	4.6 (42)
Inner Bay	June	370 (16)	851 (16)	4.9 (16)
Long Point	June			
Nanticoke	June	332 (12)	567 (12)	4.0 (11)
Port Colborne	June	364 (14)	816 (14)	4.9 (14)
Grand River	June	–	–	–
Niagara River	June			
All	July	357 (68)	766 (67)	4.9 (63)
Inner Bay	July	347 (41)	687 (41)	4.5 (38)
Long Point	July			
Nanticoke	July	314 (3)	487 (2)	4.0 (2)
Port Colborne	July	381 (24)	925 (24)	5.6 (23)
Grand River	July	–	–	–
Niagara River	July			
All	August	369 (55)	856 (54)	4.6 (54)
Inner Bay	August	–	–	–
Long Point	August			
Nanticoke	August	345 (3)	651 (3)	3.7 (3)
Port Colborne	August	370 (52)	864 (51)	4.7 (51)
Grand River	August	–	–	–
Niagara River	August			

Table 10. The distribution of angling methods used by angling parties in the eastern basin of Lake Erie from June 2 to August 31, 2003.

Angling Method	% of Parties
Still	28.5
Jig	3.4
Drift	21.0
Troll	18.0
Downrig	2.6
Spin Cast	5.8
Fly Cast	0.0
Combination/Other	20.7

Table 11. The distribution of angler origin in the eastern basin of Lake Erie from June 2 to August 31, 2003.

Angler Origin	% of Parties
Local	49.4
Ontario	48.1
Canada	0.3
United States	2.0
Other	0.3

Table 12. The distribution of angler visitor status in the eastern basin of Lake Erie from June 2 to August 31, 2003.

Angler Visitor Status	% of Parties
Permanent Resident	85.0
Non-Permanent Resident	0.9
Day Tripper	11.9
Camper- Provincial Park	2.0
Camper - Commercial Park	0.3

Table 13. Historical and recent effort, catch, harvest, and CUE estimates for walleye and smallmouth bass grouped by area (updated from Sztramko 2000).

			Walleye				Smallmouth Bass			
Year	Area	Total Estimated effort (rod-hours)	Estimated effort (rod-hours)	Estimated catch (number)	Estimated harvest (number)	CUE	Estimated effort (rod-hours)	Estimated catch (number)	Estimated harvest (number)	CUE
1990	8,9,10	245,939	71,945	15,799	15,464	N/A	57,253	37,538	14,619	0.594
	11	107,333	83,974	10,306	9,563	0.121	25,640	15,501	4,079	0.529
1991	8,9,10	245,711	56,504	5,696	5,501	0.073	61,377	45,118	21,066	N/A
	11	101,783	65,586	3,931	3,887	0.051	29,104	26,690	8,667	0.857
1992	8,9,10	291,200	57,385	4,278	4,263	0.032	126,678	80,392	35,940	0.541
	11	133,013	96,277	4,748	4,701	0.039	42,128	26,608	11,283	0.580
1998	8,9,10	462,333	61,543	3,716	3,682	0.076	238,551	201,564	89,183	0.687
	11	267,627	155,062	17,534	15,524	0.108	94,454	74,220	25,034	0.603
2003	8,9,10	138,006	3,994	520	495	0.133	60,552	77,820	22,307	1.261
	11	49,514	26,835	2,711	2,147	0.121	20,563	15,165	2,497	0.563

CUE = observed targeted catch in numbers / observed targeted effort in rod hours

Table 14. Historical and recent effort, catch, harvest, and CUE estimates for yellow perch and rainbow trout grouped by area (updated from Sztramko 2000).

			Yellow Perch				Rainbow Trout			
Year	Area	Total Estimated effort (rod-hours)	Estimated effort (rod-hours)	Estimated catch (number)	Estimated harvest (number)	CUE	Estimated effort (rod-hours)	Estimated catch (number)	Estimated harvest (number)	CUE
1990	8,9,10	245,939	41,649	84,434	38,977	1.154	10,654	714	714	0.043
	11	107,333	14,005	7,520	3,763	0.323	3,837	206	206	0.041
1991	8,9,10	245,711	40,102	80,768	39,338	1.064	6,375	926	843	0.065
	11	101,783	12,168	5,721	2,721	0.326	3,317	174	174	0.050
1992	8,9,10	291,200	38,388	87,960	34,125	1.072	33,140	2,400	2,400	0.043
	11	133,013	14,314	6,977	3,243	0.281	3,264	212	212	0.065
1998	8,9,10	462,333	89,764	207,038	109,684	0.724	22,210	2,506	2,425	0.130
	11	267,627	16,858	15,655	11,457	0.662	791	231	231	0.063
2003	8,9,10	138,006	62,073	117,296	86,218	2.027	8,770	775	753	0.143
	11	49,514	4,196	1,070	564	0.254	1,128	32	32	0.014

CUE = observed targeted catch in numbers / observed targeted effort in rod hours

Table 15. Mean number of trailers calculated from weekly counts recorded throughout the summer at peak fishing times, across the eastern basin. Activity includes both fishing and recreational boats.

Access Point	Activity (mean # trailers)
Sugarloaf Marina	27.21
Turkey Point Marina	15.92
Port Dover Marina	14.04
Hoover's Marina	12.92
Crystal Beach	12.75
Long Point Provincial Park	10.46
Chippawa Boat Launch	8.38
Old Cut Boat Livery	6.08
Booth's Harbour	5.16
Lowbanks Marina	5.08
Trailor Park	4.20
Port Maitland (east)	3.92
Dunnville BBQ	3.75
Port Maitland (west)	3.29
Fin and Feather	3.24
Shadyacres	3.08
Dunnville Boatclub Ramp	2.50
Sandboy Marina	2.36
Post's Marina	2.32
Port Rowan Harbour	2.28
Fort Erie Marina	1.88
Point Abino	1.63
Byng Park	1.38
Niagara Parkway Marina	1.33
Marshview Variety	1.20
Port Dover Creek	1.12
Long Beach Conservation	1.04
Inner Bay Marina	1.00
Knights Beach	0.76
Marina Shores	0.48
Bluebill Marina	0.48
Hilltop Marina	0.40
Cronmillers	0.20

Table 16. Estimates for smallmouth bass and largemouth bass reported during the Long Point Bay roving creel survey from June 28 to July 31, 2003 (updated from OMNR 2001).

Year	Total estimated effort (rod-h)	Smallmouth bass				Largemouth bass			
		Estimated effort (rod-h)	Estimated catch (number)	Estimated harvest (number)	CUE	Estimated effort (rod-h)	Estimated catch (number)	Estimated harvest (number)	CUE
1984	159,790	112,411	50,261	35,975	0.388	13,351	3,852	1,993	0.300
1985	153,671	109,940	48,485	40,843	0.366	10,310	5,260	3,340	0.491
1986	167,151	129,637	59,312	46,938	0.425	14,239	9,462	5,697	0.526
1987	114,338	92,742	42,892	30,779	0.456	14,881	7,288	3,317	0.422
1988	118,259	102,364	63,411	53,477	0.502	20,853	5,171	2,768	0.325
1989	114,564	80,352	45,137	32,160	0.476	10,726	10,031	2,956	0.638
1990	105,434	87,720	44,053	30,236	0.412	18,218	16,927	5,662	0.855
1991	88,520	61,575	36,296	26,609	0.453	17,783	10,304	4,169	0.420
1992	121,042	97,564	54,457	41,467	0.520	25,670	13,876	5,018	0.559
1993	112,353	86,770	52,352	40,772	0.516	16,081	11,082	3,375	0.545
1994	99,990	76,670	50,799	31,347	0.597	14,442	9,705	3,682	0.632
1995	129,526	92,457	54,286	31,511	0.538	23,942	16,957	4,818	0.598
1996	99,754	66,057	30,496	24,448	0.421	8,280	3,390	1,638	0.434
1997	111,959	82,938	56,704	39,335	0.670	14,869	8,308	1,337	0.470
1998	155,486	121,651	111,632	76,914	0.715	17,167	13,165	6,714	0.624
1999	101,436	64,977	57,943	30,660	0.529	5,167	5,548	1,579	0.683
2000	81,029	61,823	26,903	23,489	0.418	8,820	4,027	1,837	0.306
2001	102,718	91,307	44,858	31,261	0.343	3,710	1,829	384	0.285
2002	65,000	56,158	32,025	23,300	0.525	4,066	1,498	609	0.324
2003	76,669	68,687	36,865	26,529	0.530	5,550	2,105	397	0.341

CUE= observed targeted catch/observed targeted effort in rod-hours
Total Estimated Effort= effort expended by all anglers for all species
Estimated Effort=effort targetted for a given species
Estimated Catch and Harvest= realized by all anglers

Table 17. Estimates for rock bass and yellow perch reported during the Long Point Bay roving creel survey from June 28 to July 31, 2003 (updated from OMNR 2001).

Year	Total estimated effort (rod-h)	Rock bass				Yellow perch			
		Estimated effort (rod-h)	Estimated catch (number)	Estimated harvest (number)	CUE	Estimated effort (rod-h)	Estimated catch (number)	Estimated harvest (number)	CUE
1984	159,790	12,238	11,187	6,313	0.684	31,203	50,602	24,862	1.065
1985	153,671	1,196	2,125	1,254	0.926	8,266	20,462	9,010	1.851
1986	167,151	2,209	1,770	1,305	0.558	14,089	28,735	15,669	1.689
1987	114,338	1,109	50,614	7,600	0.759	8,966	62,157	20,869	2.392
1988	118,259	3,322	71,910	8,537	0.992	3,758	24,781	9,325	2.395
1989	114,564	5,207	83,344	15,505	1.217	8,278	26,072	9,624	1.224
1990	105,434	201	71,571	9,783	2.296	1,625	16,590	3,012	0.966
1991	88,520	5,761	25,979	8,140	0.717	6,125	22,071	7,890	1.944
1992	121,042	4,753	67,228	17,617	0.995	4,167	12,852	5,901	1.336
1993	112,353	1,087	34,070	7,734	1.535	691	7,874	3,660	1.961
1994	99,990	13,788	56,804	6,496	1.437	8,451	28,263	10,040	2.389
1995	129,526	4,848	34,629	8,826	0.839	17,948	24,951	8,857	1.114
1996	99,754	585	29,644	6,674	0.597	10,395	19,997	12,339	1.058
1997	111,959	11,892	22,340	5,241	0.420	13,864	26,929	11,293	1.420
1998	155,486	1,370	46,544	22,955	0.705	9,962	70,613	25,685	4.422
1999	101,436	2,722	7,838	1,384	0.346	22,049	29,028	17,325	1.085
2000	81,029	4,761	10,738	2,060	0.245	14,178	18,526	7,973	1.411
2001	102,718	5,181	9,704	2,004	0.259	28,795	28,388	9,065	0.987
2002	65,000	220	2,053	179	0.223	15,527	10,237	3,459	0.462
2003	76,669	1,329	2,599	256	0.326	15,893	10,175	4,883	0.567

CUE= observed targeted catch/observed targeted effort in rod-hours
Total Estimated Effort= effort expended by all anglers for all species
Estimated Effort=effort targetted for a given species
Estimated Catch and Harvest= realized by all anglers

Appendix 1. Expanded description of FISHNET calculations used to produce creel estimates (Lester and Korver, 1996).

Activity:

Initial estimate of fishing trips — $TRIPNE_{hij} = ATYCNT_{hij}$

ATYCNT= activity count
h= stratum
i= sample day
j= line of log form

Total number of trips that occurred during the sampled STRATUM-PERIOD — $TRIPNE_{hi} = \text{Sum of } TRIPNE_{hij}$

Effort:

Estimated party effort — $EFFPE_{hi} = TRIPNE_{hi} * \text{Sum of } EFFDUR_{hik} / CIF_NN_{hi}$

EFFDUR= duration of the fishing trip
CIF_NN= number of interviews
k= an interview

Estimated angler effort — $EFFAE_{hi} = TRIPNE_{h,} * \text{Sum of } EFFAO_{hik} / CIF_NN_{hi}$

$EFFAO = EFFDUR_{hik} * ANGLERS_{hik}$ (number of anglers)

Estimated rod effort — $EFFRE_{hi} = TRIPNE_{hi} * \text{Sum of } EFFRO_{hik} / CIF_NN_{hi}$

$EFFRO = EFFDUR_{hik} * RODS_{hik}$ (number of rods)

Catch and Harvest:

Daily estimates of #s caught — $CATNE_{hi} = TRIPNE_{hi} * \text{Sum of } CATNO_{hik} / CIF_NN_{hi}$

CATNO= number of fish (of a given species)

Daily estimates of #s harvested — $HVSNE_{hi} = TRIPNE_{hi} * \text{Sum of } HVSNO_{hik} / CIF_NN_{hi}$

HVSNO= number of fish harvested

Targeted Effort, Catch, and Harvest:

Targeted effort $EFFAE1_{hi} = TRIPNE_{hi} * \text{Sum of } EFFAO1_{hik} / CIF_NN_{hi}$

EFFAO1= EFFAO if the species was sought and 0 otherwise

Targeted catch $CATNE1_{hi} = TRIPNE_{hi} * \text{Sum of } CATNO1_{hik} / CIF_NN_{hi}$

CATNO1= CATNO if the party was seeking the species and 0 otherwise

Targeted harvest $HVSNE1_{hi} = TRIPNE_{hi} * \text{Sum of } HVSNO1_{hik} / CIF_NN_{hi}$

HVSNO1= HVSNO if the party was seeking the species and 0 otherwise

Stratum Estimates:

Total effort per stratum $EFFAE_h = STRAT_DAYS_h * meanEFFAE_h$

meanEFFAE= Sum of $EFFAE_{hi}$ / SAM_DAYS_h (# of days sampled)
STRAT_DAYS= # of days in the stratum

Variance of this estimate $var(EFFAE_h)=FPC_h*STRAT_DAYS_h^2*var(meanEFFAE_{hi})$

FPC= finite population correlation factor ($FPC_h = 1-SAM_DAYS_h / STRAT_DAYS_h$)

Variance of the daily mean $var(meanEFFAEh) = s^2 / SAM_DAYS$

$s^2 = (\text{Sum of } (EFFAE_{hi} - \text{mean } EFFAE_h)^2) / (SAM_DAYS_h - 1)$

Relative standard error of an estimate is obtained by dividing the standard error of the estimate (SE(r)) by the estimate itself (r) and multiplying by one hundred.

RSE=100 x (SE(r)/r)

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